APPLIED HYDRAULICS

THE MAGAZINE OF FLUID POWER TRANSMISSION

OCTOBER, 1950

ENGINEERING
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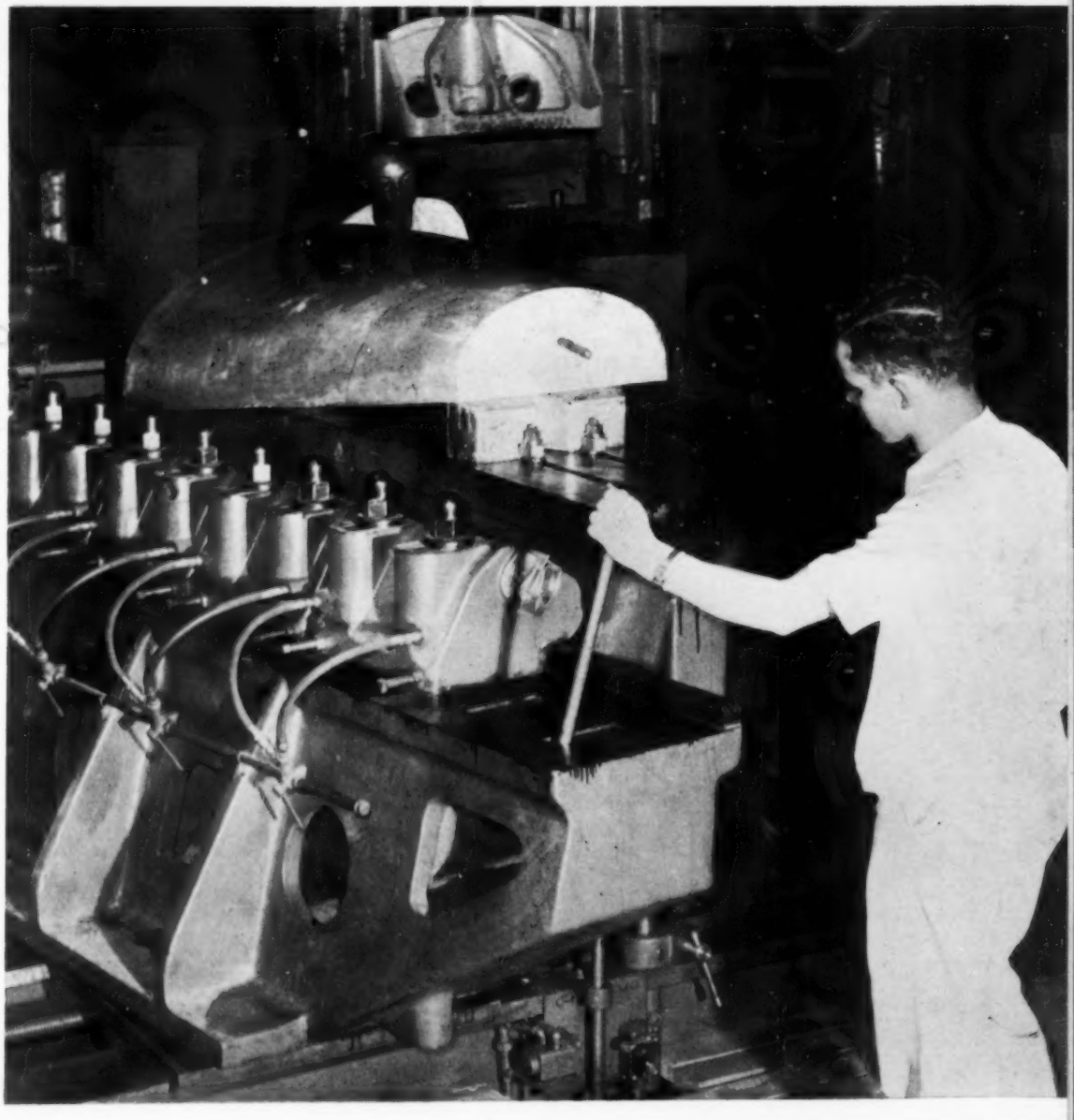
- HYDRAULIC CIRCUITS
- HYDRAULIC CONTROLS
- AIR CIRCUITS
- AIR CONTROLS
- ELECTRICAL AND ELECTRONIC CONTROLS



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Always first

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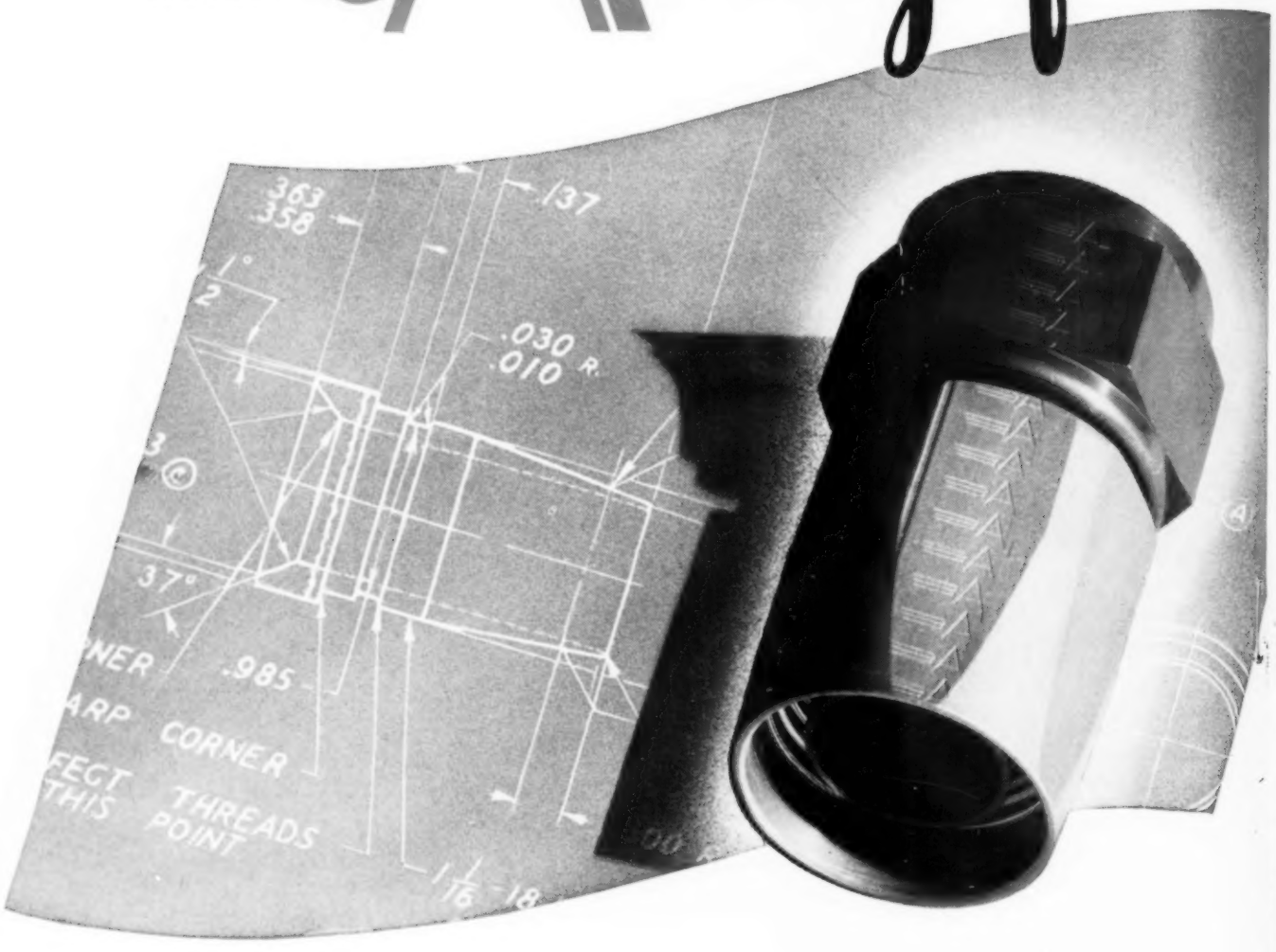

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APPLIED HYDRAULICS
The Magazine of Fluid Power Transmission

FRONT COVER: The die is being fitted in a hydraulically operated metal stretcher which can stretch quarter inch thick metal into a thin knife edge sheet. Holding jaws grasp the work while a die, moving upward on an elevating platform, stretches the sheet.

Photo by Authenticated News

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THE FIRST ANNUAL DIRECTORY NUMBER

applied HYDRAULICS

THE MAGAZINE OF FLUID POWER TRANSMISSION

1240 ONTARIO STREET
CLEVELAND 13, OHIO
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FIRST ANNUAL DIRECTORY NUMBER

Dear Reader:

From the very first issue of APPLIED HYDRAULICS Magazine, each month we have received hundreds of requests from our readers for information on where certain hydraulic and air circuit equipment can be purchased and what companies make this type of equipment. There is now no one place where such information can be obtained.

To provide a central reference, APPLIED HYDRAULICS Magazine, as a service to its readers, will issue each year an Equipment Directory Issue. The first annual Directory Issue will be our January 1951 number – it will include:

(1) A complete product listing
(2) A manufacturers listing
(3) A listing of components and services

We know that this Directory Issue will prove invaluable to you in procuring hydraulic and air circuit equipment and components. Be sure to watch for this First Annual Directory Number.

THE EDITORS.

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LETTERS to the Editor

Would you know of a firm that produces a small hand operated oil hydraulic unit? We need such a unit for a lifting operation in a product that we now produce. It would be necessary that the entire unit be not greater than 50 cubic inches in size and that the lever for the hand pump be not longer than 5 or 6 inches.

J. S. L.

Our present product list does not list such a unit as a standard component. However, we are sending you the name of several companies that would be in a position to discuse this with you. We would appreciate learning of your application. We'll send along more definite information as we can.

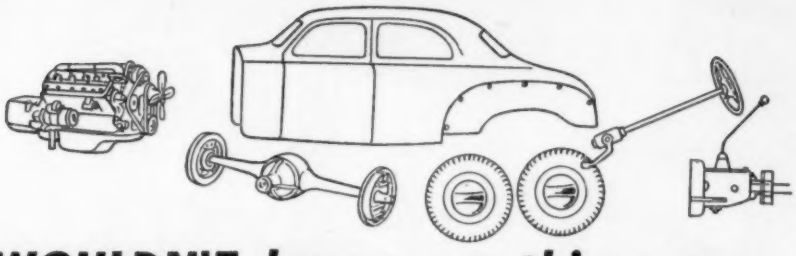
We would appreciate it if you could help us identify the first hydraulic application to a machine tool and, if possible, the type of machine, the function and the type of product made. *these machines, with their de-*

J. O.

This is a pretty big order but we got in touch with several of the "old timers" in the hydraulic field and put these questions to them. The information, digested, received to date can be briefly stated. The oldest application authoratively reported was a hydraulic variable speed drive of a lathe spindle in 1914. Walter Ferris, then with the Bucyrus Company (now Bucyrus-Erie) was working on a satisfactory dipper thrusting gear on excavating machines, his goal being to replace the conventional steam engine. A small axial type hydraulic transmission with variable stroke pump of about 6 cu. in. maximum displacement and a constant stroke motor of the same size were built and used to drive a lathe in the Bucyrus toolroom from December 1914 to about April 1915. Mr. Ferris reports that the performance was quite satisfactory.

Benjamin Lassman, veteran hydraulic engineer, states that the earliest installations of hydraulics to standard machine tools was "over 28 years ago" by the Lapointe Machine Tool Co. on hydraulic broaches and "about 24 years ago" by the American Broach Co., also on

(Continued on page 20)



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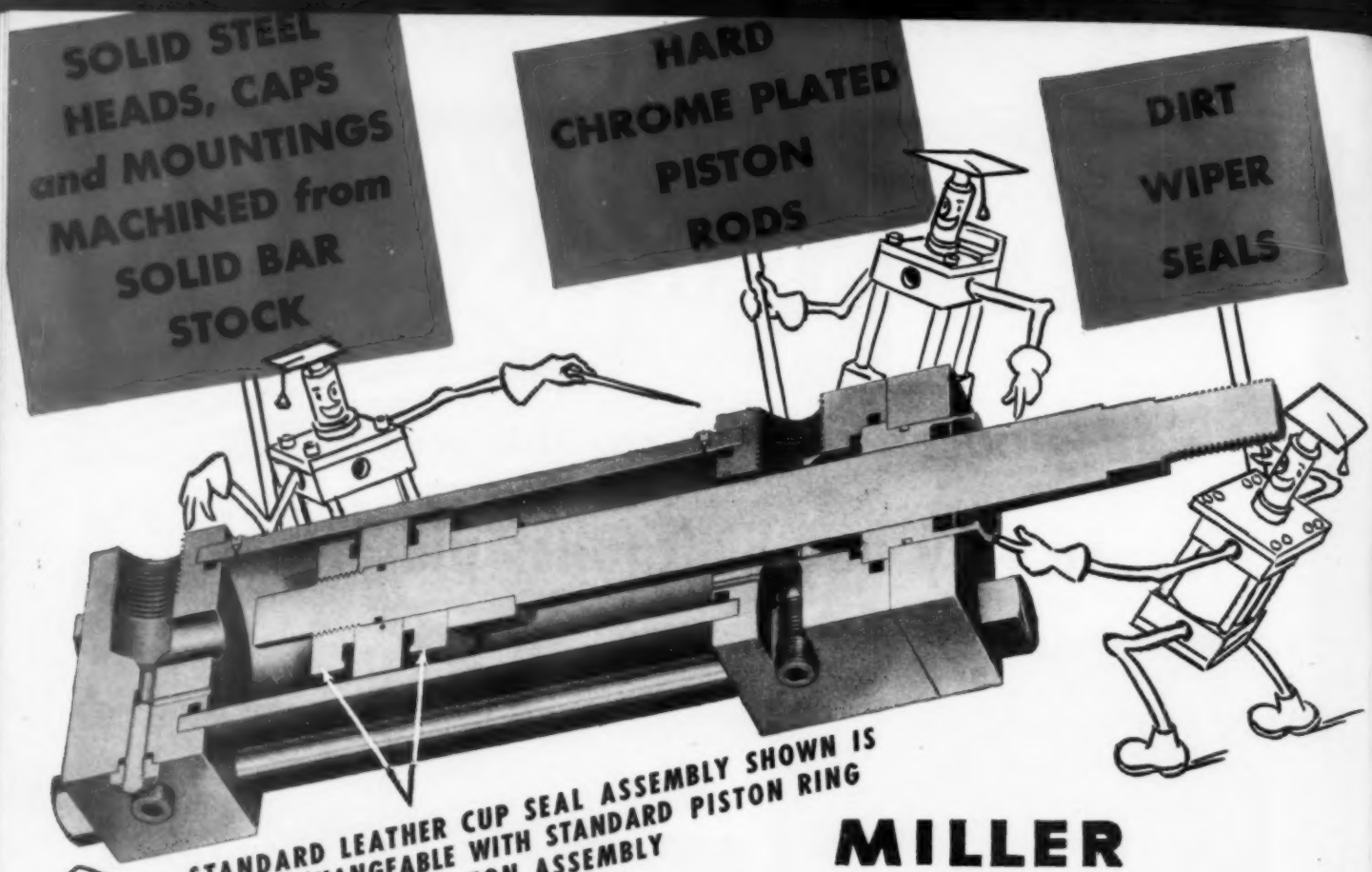
ENGINEERS AND BUILDERS OF OIL HYDRAULIC EQUIPMENT SINCE 1921

4315



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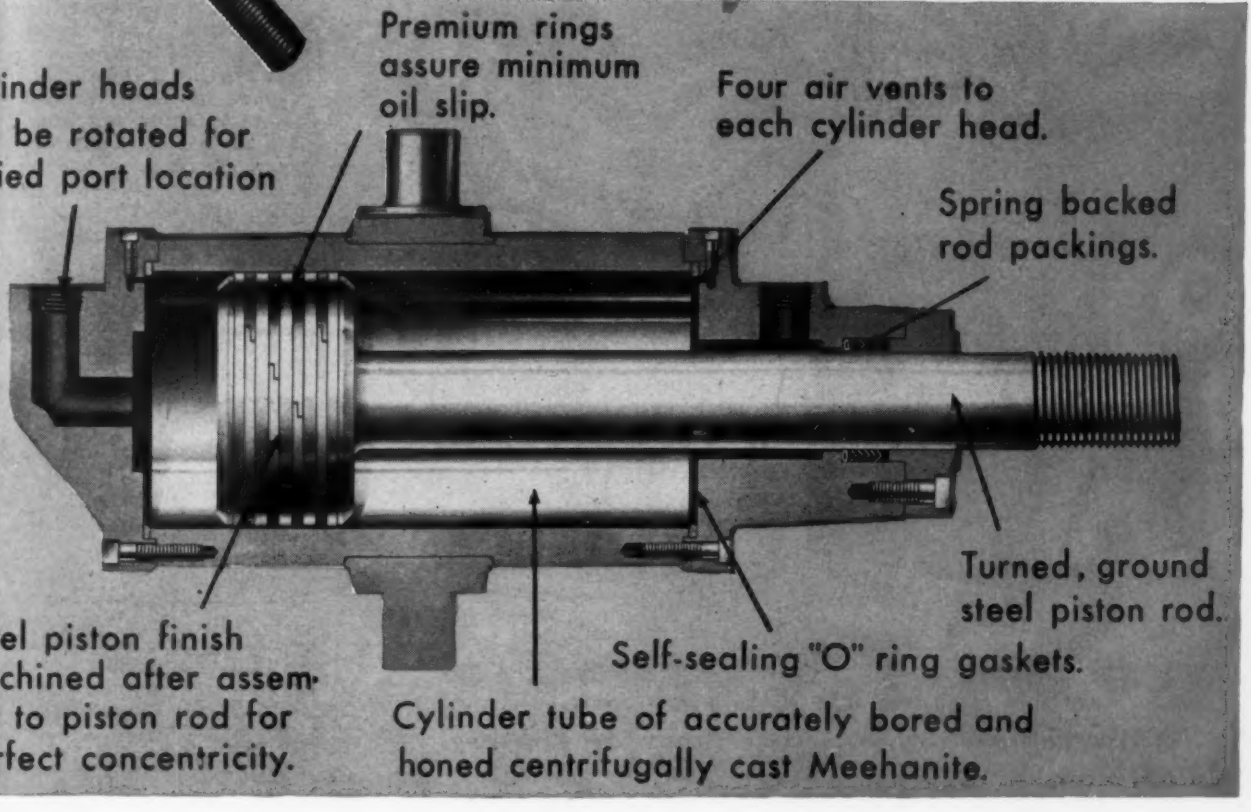
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All Aldrich Pumps Have STAYING POWER

(Continued from page 14)

hydraulic broaches. On machines other than machine tools, Mr. Lassman reports applications of radial cylinder pumps to heavy duty rolling mill machinery, the earliest more than 28 years ago. The first standard installations of hydraulic equipment to machine tools were shown at the 1927 Machine Tool Show, according to Guy Hubbard, machine tool editor of "Steel". At that time Cincinnati Milling Co. and Oilgear Co. exhibited broaching machines. These were for internal broaching, surface broaching following several years later. At the same Show the Rockford Machine Tool Co. exhibited a hydraulic planer and Kearney & Trecker had an experimental hydraulic circuit on one of their milling machines. W. F. Hall, now retired, who began to sell machine tools for Motch & Merryweather in 1904, states that to his best recollection, the first hydraulic machines were broaches.

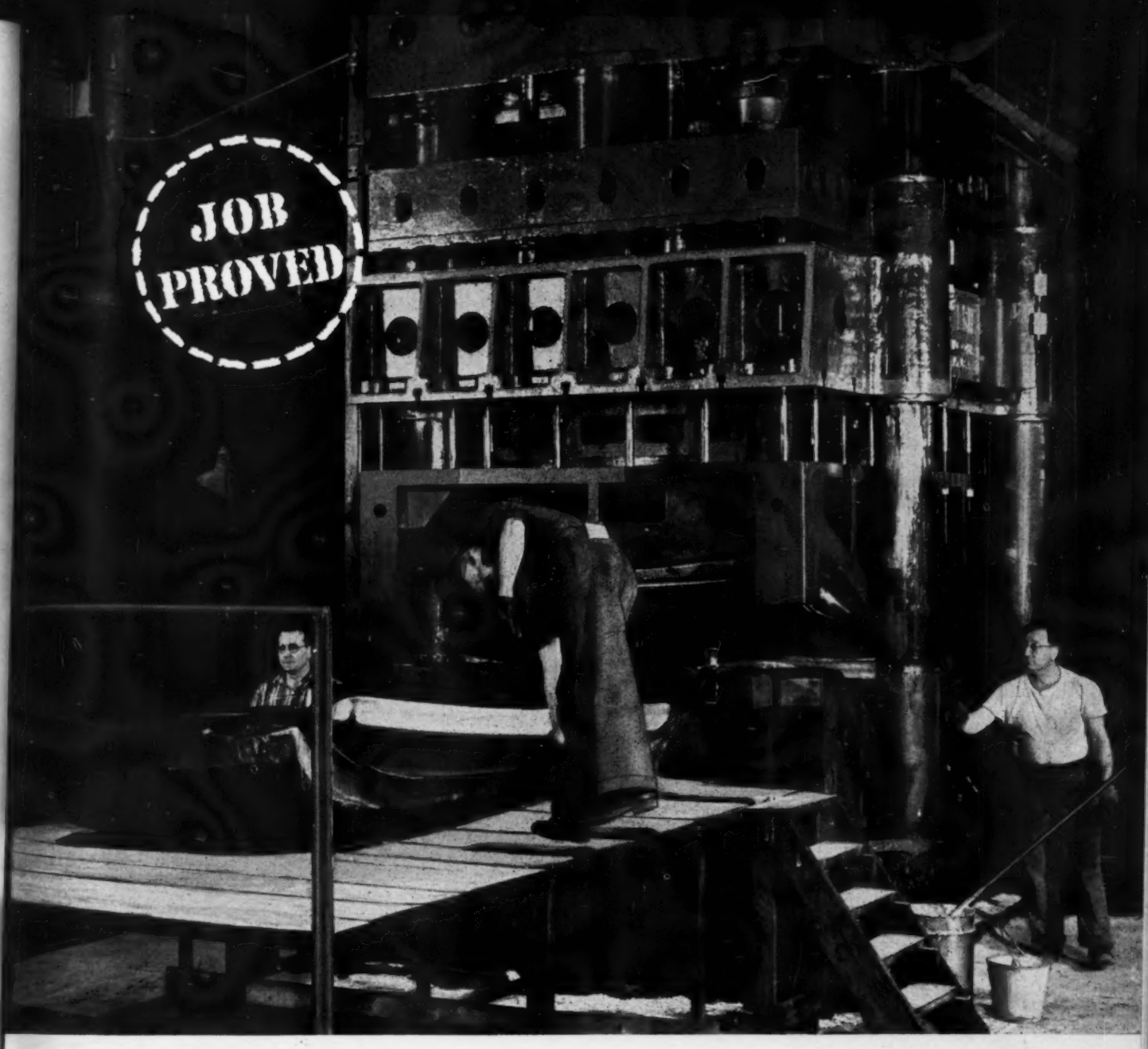
P.S. The Editor invites correspondence with readers who have information of early hydraulically operated machine tools.

Can you tell us where we can secure a list of manufacturers of high pressure hose and hose assemblies? We are trying to find a hose that will stand up under operating pressures of 1000 psi or more with surges that run considerably higher.

J. P.

We are sending you such a list. This list, perhaps more detailed, will also be published as a part of a complete listing of hydraulic and pneumatic products and components, parts and services in the First Annual Directory issue in January.

A number of individuals have written us regarding the J. I. C. Pneumatic Standards for Indusrial Equipment. At an initial meeting held at General Motors in Detroit on May 3, tentative J. I. C. Pneumatic Standards for Industrial Euipment were formulated using J. I .C. Hydraulic Standards as a pattern. Specifications in the Hydraulic Standards which were applicable to pneumatic equipment were adopted as a starter and copies of the tentative Pneumatic Standards were sent to a number of large users of pneumatic equipment and to manufacturers for study. The tentative Standards will be used as a basis for discussion at a two day Joint Industry Conference Scheduled for Wednesday and Thursday, September 21 and 22 at the Ford Motor Co., Dearborn, Mich.



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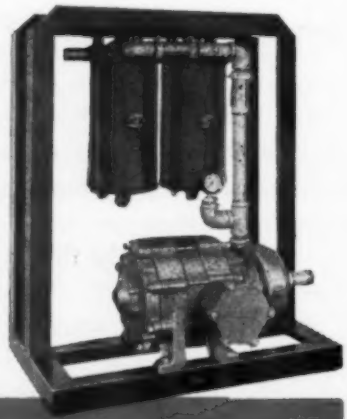

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Hydraulic Committee Plans New Meetings

J. Newton, chairman, the Committee on Hydraulic and Pneumatic Systems, announces a new series of six seminar meetings scheduled for the fourth Tuesday of each month beginning October 24. The first meeting will hear Frank C. Mittell, hydraulic engineer, North American Aviation, Inc., on the subject, "Pressure and Weight Relations in Hydraulic Systems".

The Committee on Hydraulic and Pneumatic Systems has conducted two series of six meetings each the past two years; the new series follows the general theme of practical applications. The Committee, an activity of the Southern California Section of ASME, is sponsoring the preparation of a "Recommended Good Practice Manual" at the junior design engineer level and three technical groups are at work on this project. This project is supplementary to the seminar meetings.

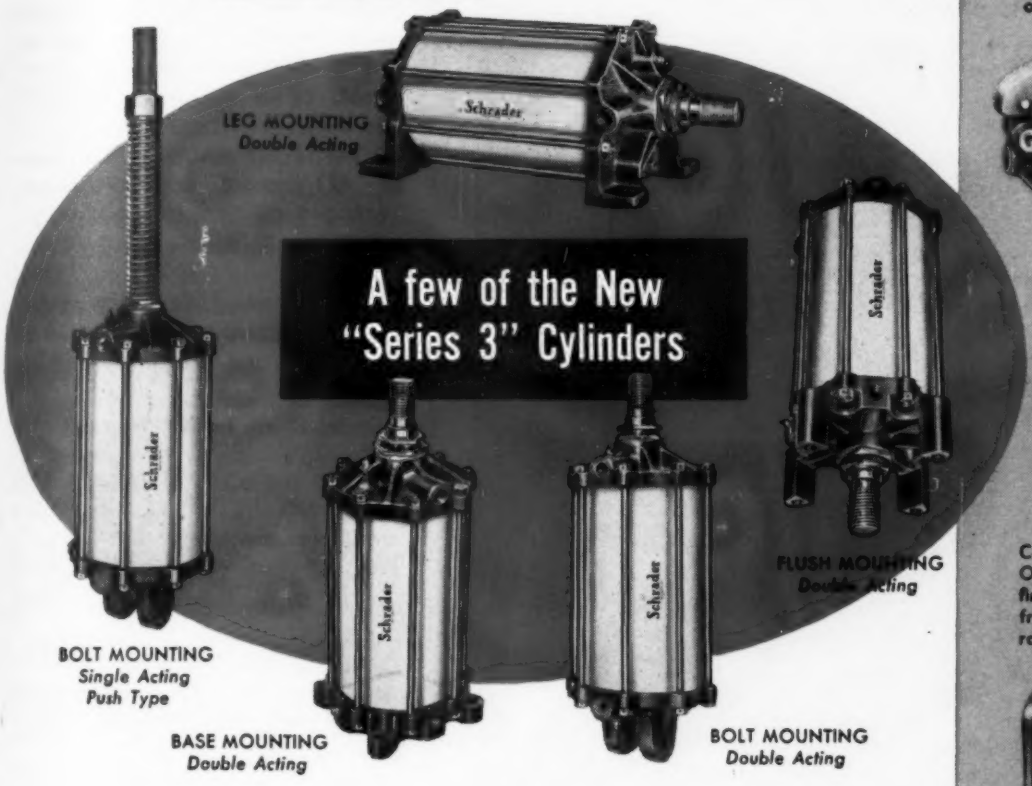
Cleveland Engineering Society Presents "Case Studies"

Starting October 5th, the Machine Design division of the Cleveland Engineering Society is sponsoring five sessions on hydraulics. At each meeting, a case study will be presented by men who have worked directly with the equipment being discussed.

Design, production and maintenance features of the hydraulic application will be stressed. An analysis of the circuit digram will include selection of components, piping, instrumentation and electrical control. Speakers for these meetings include: Paul Simonds, Vickers Inc.; Harvey Barnes, Hannifin Corporation; E. C. Wollagher. Oilgear Company, and George Miller, Racine Tool and Machine Co.

The autumn series will meet on Thursday evenings: October 5, 19, 26, November 2 and 16.

Make hard work EASY with BRUTE POWER from these BRAWNY NEW AIR CYLINDERS



What's your problem? Operating press brakes, clutches, doors, clamping work, lifting or lowering, pushing or pulling heavy loads?

Investigate the time-saving, work-saving advantages of the new Schrader Air Cylinders. See how they do hard jobs faster, safer, better.

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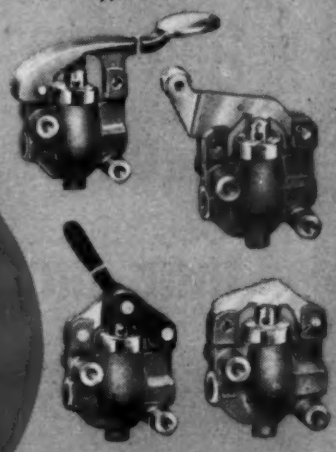

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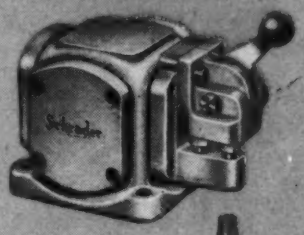
Completely new in design. Operates at the touch of a finger. Diaphragm seat. Large free air capacity. Ports arranged for hidden piping.



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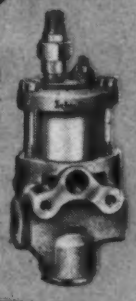
One of many types of Schrader Pilot Valves, 2 or 3-way, with or without timer.



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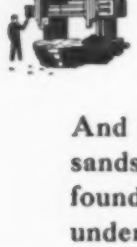
Actual tests prove that Sirvis packings require less replacement than any other type



And the proof lies in the experience of thousands of maintenance engineers. They have found that Sirvis packings stand up longer under extreme pressures, friction and the action of hydraulic fluids. Replacement time is cut, operation costs reduced. It will pay *you* to install *Sirvis* packings.

• ***Sirvis leather packings are engineered from top grade steerhide, specially tanned and treated. They are scientifically designed for all types of mechanical applications.***

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Here's How

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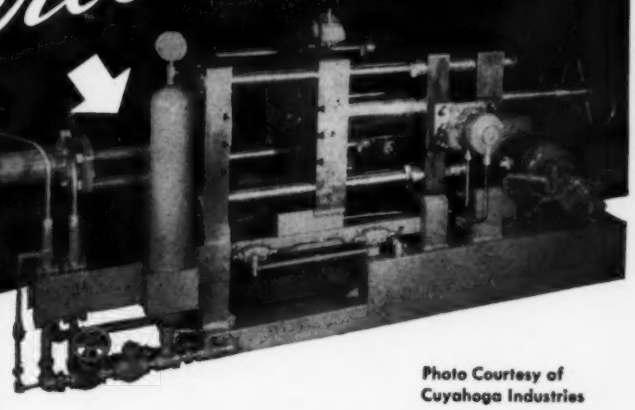

Photo Courtesy of Cuyahoga Industries

A GREER ACCUMULATOR SAVED COST AND FLOOR SPACE IMPROVED EFFICIENCY OF DIE CASTING MACHINE

MR. J. L. LOVE, *President*
Cuyahoga Industries
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"Our prime objective in designing this new Wedgelock Die Casting Machine was to put out a quality unit at a fair price. Every feature was carefully tailored to fit the needs of the die casting industry for a unit that incorporated everything possible to make it safe, practical, economical and positive locking with ease of die adjustment. The Greer Accumulator was chosen as one of the main quality parts which helped us attain our objective."

"The Greer Accumulator permitted us to use a 15 h.p. motor instead of one of 45 h.p., providing a saving in original cost and 32 sq. ft. of floor space. In addition, the accumulator stopped excessive heating of system oil and eliminated hazardous sludge in the tank."

This is but one of numerous applications where Greer Accumulators are reducing operating cost and improving safety and efficiency of equipment and machines.

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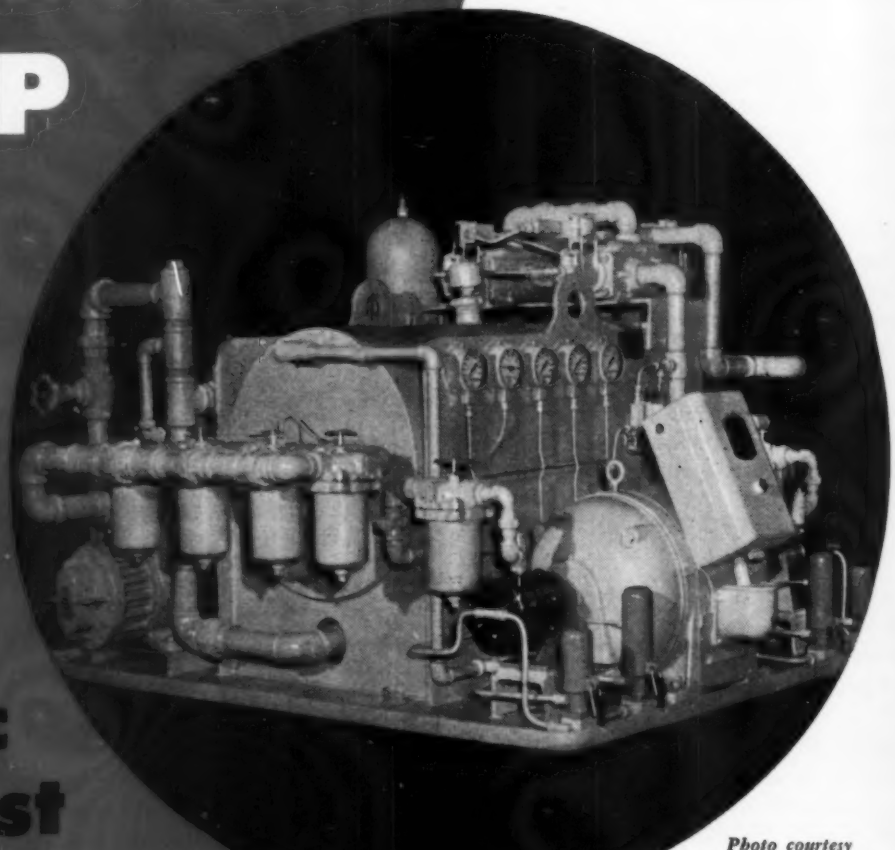
REDUCE PUMP UPKEEP COSTS



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Hydraulic pumps last longer when you use TEXACO REGAL OILS (R&O)

LONGER pump life is only one of many benefits you can count on when *Texaco Regal Oil (R & O)* goes in as your hydraulic medium. You'll find the whole system stays cleaner, you'll stop worrying about stoppages, your maintenance costs will come down.

Texaco Regal Oils (R & O) keep rust and sludge out of your systems. These world-famous turbine-quality oils are specially fortified to resist foaming and oxidation and to inhibit rust. The entire system stays clean . . . and you get much longer oil service life. Thus, *Texaco Regal Oils (R & O)* cost less to use.

No matter how severe your hydraulic service . . . no matter what size or type of power package you are using . . . there are *Texaco Regal Oils (R & O)* to assure you better performance at lower cost. *Texaco Regal Oils (R & O)* are recommended and used by leading hydraulic manufacturers.

Let a Texaco Lubrication Engineer tell you more about these cost-saving hydraulic oils. Just call the nearest of the more than 2,000 Texaco Wholesale Distributing Plants in the 48 States, or write:
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TEXACO

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FOR ALL HYDRAULIC UNITS

TUNE IN . . . TEXACO STAR THEATER starring MILTON BERLE on television every Tuesday night. See newspaper for time and station.

By WILLIAM LARKIN
General Foreman
Pullman Standard Car Mfg. Co.
Hammond, Indiana

Pressing One Million Wheels

The modernization of a car wheel press which in five years has pressed one million wheels more smoothly and more economically than was possible with the original equipment.

FIVE YEARS AGO, AS PART OF OUR CONTINUOUS program to modernize our shop equipment, we removed a crank type plunger pump from our 120-ton wheel press and replaced it with a variable delivery, radial rolling piston pump. We recently completed pressing 500,000 pairs of wheels—one million wheels—since we installed the latter pump.

It is essential that the pressing or forcing of wheels on axles be done with a smooth, even application of power. To do this and to accommodate individual differences in fitting tolerances, it was very desirable that a reliable automatic means be employed for an adjustable holding pressure that could be maintained on work indefinitely without excessive heating or power loss.

The wheel presses as originally equipped had been in operation for some years. The basic design—a single acting ram press in which car wheels are forced by ram travel onto the ends of axles—was not changed. However, with new machines and improved production techniques being added steadily in the shop, the production

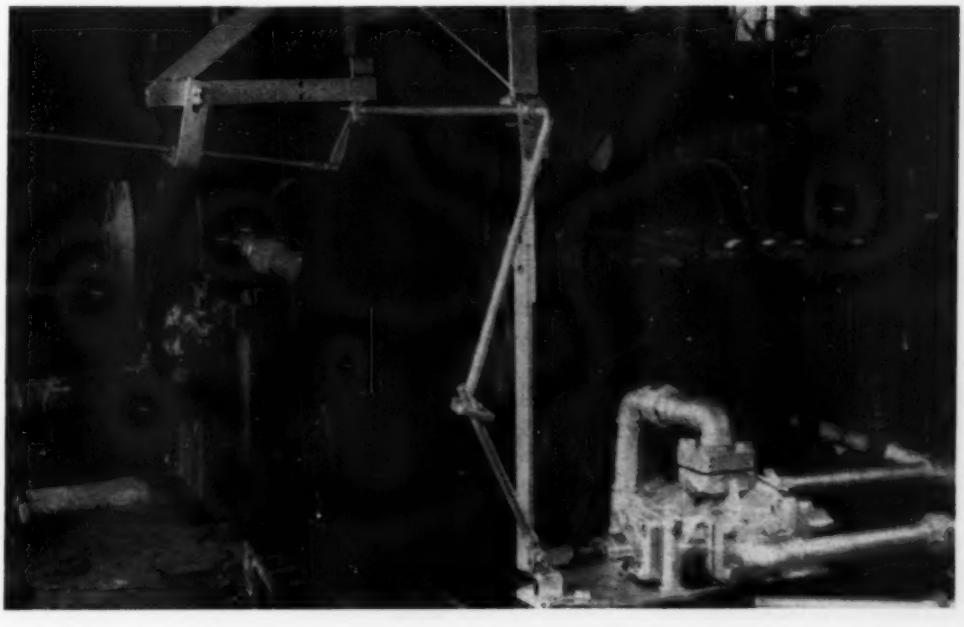


Fig. 1. The ram side of the wheel press showing the four-way directional control valve (on stand) and pump (right). The overhead linkage permits manual contol of the valve from the operator's position in front of the press.

of the wheel press lagged. It was apparent that the press had either to be replaced or redesigned and equipped to accommodate an increased volume.

Factors Involved in Changeover

In the analysis which was made to determine what should be done, we listed several other factors, in addition to an increase in production capacity. The first of these was a power source that would force the wheels on to the axles a precise distance and smoothly with an even straight line of application. A second factor was maintenance and time lost in downtime. Wheel presses must meet heavy, steady schedules. Downtime for any reason means disruptions throughout the shop. We insisted that a new press or the re-equipment of our old press perform with a minimum of maintenance and that shut downs caused by power source failures be eliminated as far as possible. A third factor was space. This space factor included crew working space, storage strip area available and space for the new equipment itself. The latter meant that the new equipment had to be fitted into existing space, that operating controls be convenient and that machine components be readily accessible for service and maintenance.

With these factors in mind we called in representatives of several press manufacturers and pumps. After careful consideration of all the factors involved we decided to keep the press and to replace the original pump. On the basis of the performance possibilities a standard variable delivery pump was decided upon. The unit selected was a stock package pump-tank-motor assembly of approximately 20 hp output for delivery of 2500 psi normal working pressure.

Fig. 2. Section of recording gage chart showing smooth tonnage curves, indicating even, straight line application of power to wheels during the pressing operation.

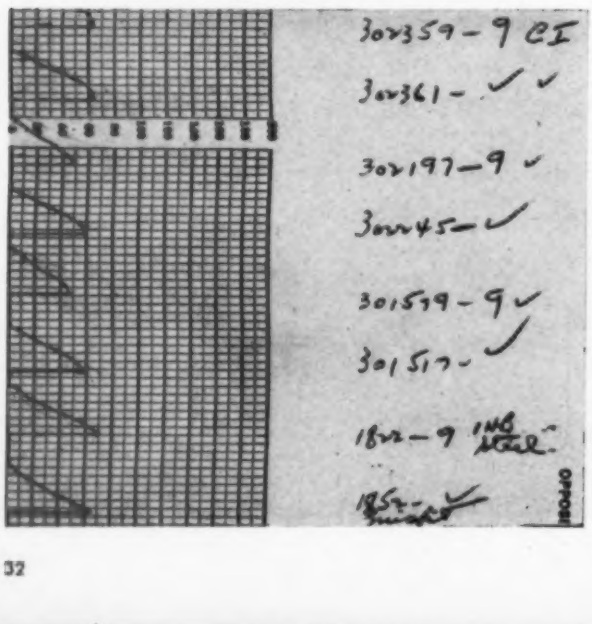


Figure 1 shows the pump (right) and the four-way directional control valve as set up on the operator's side of the ram end of the wheel press. The old crank type plunger pump which had been "temporarily" disconnected when the new pump was installed is shown behind the control valve.

Since we use the press for pressing on all standard sizes of new and reconditioned wheels, both cast iron and steel, the most desirable working pressures vary from job to job. The ability of the operator to adjust to an optimum pressure easily and quickly with this pump has proven one of the most satisfactory features with us. This has given us an excellent control over the exact ram force needed to press wheels onto axles at the correct speed and pressure. If there is a most critical factor in this operation, it is the smooth, straight line application of force.

Recording Gauge Chart Tells the Story

One of the difficulties we had encountered with our previous equipment was the unevenness of applied pressure and consequent jerky movement in the pressing operation. The press was equipped with a recording gauge chart on which individual tonnage curves were inscribed for each press operation. The irregular, sharply, broken lines recorded only too clearly the erratic pressing performance. Figure 2 is a reproduction of a section of the same gauge chart with the tonnage curves obtained with the present equipment. The even, almost straight lines of the pressure rise indicates a smooth application of force applied to the wheels during the pressing operation. It is clear that the variable delivery pump has eliminated the ragged, uneven pressing which had been a recurrent difficulty. We know of no practical way to estimate the reduction in vibration or the reduced stresses placed on the press parts. However, we have been able to check accurately on the overall saving in power cost, the cooler operation and the extended life of the hydraulic oil.

On the original installation it was almost impossible to return the ram after a rather jerky pressing operation, regardless of the number of counterweights added. The representative of a leading packing manufacturer, after a careful study of our new hydraulic circuit, recommended a fabricated synthetic rubber "V" packing, designed for operation to 2000 psi and to temperatures up to 180 F. A standard size (16½ in OD x 15 in ID) set to 3⅞ in overall stack height, was selected. Each set consisted of nine pressure rings plus a male and female adapter. The packings were of standard split "V" construction.

Since the proper installation was important, we followed instructions closely. The packings were drawn up evenly on the bolt circles until the gland was tight, with finger pressure applied on the studs. Then a complete turn by a wrench

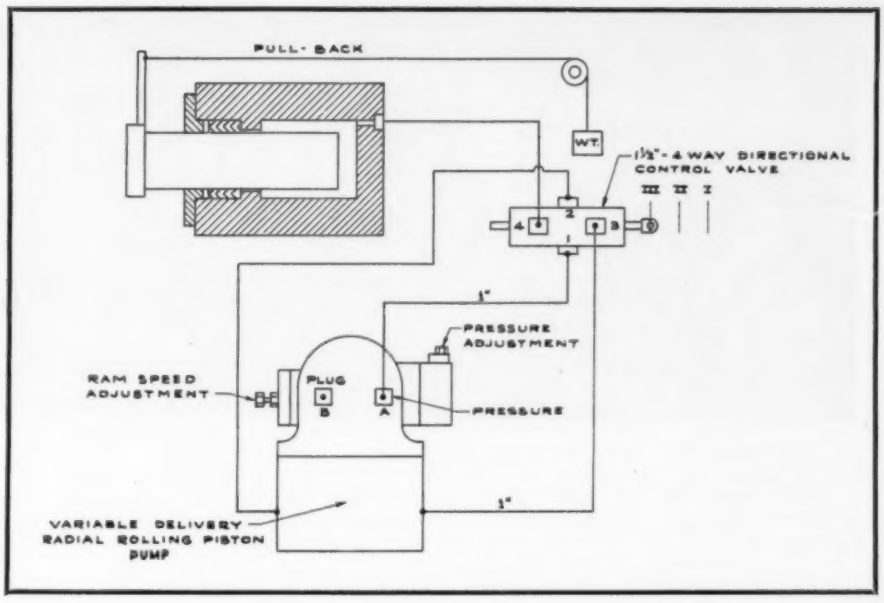


Fig. 3. Schematic circuit showing the three positions of the valve to control the operation of the press ram.

was made on each stud; after the packings had seated themselves, the studs were loosened one-half turn to allow for any possible swell during operation.

When the new setup was ready to run, attention was given to the hydraulic oil. A 150 Saybolt seconds at 100 F viscosity oil, supplied by the same manufacturer that supplied the packings, was in service and had been used for five years. Only two months ago a gum solvent was added to the hyraulic system at the rate of 5 percent of the volume of oil in the reservoir, the mixture run for 100 hours and drained. Laboratory tests of the drained oil indicated that the gums were sufficiently low that the oil would have run for an additional indefinite period. However, it was a management decision that it was time to clean up the valves and reservoir, so the change was made. Needless to say, when the oil was replaced, the same grade and type of oil was again poured into the reservoir.

The pump selected was a standard one-way, variable delivery, radial rolling piston pump with a rated delivery of 14.7 gmp. (3400 cu/min) at 1140 rpm and 2500 psi. Equipped with automatic pressure unloading control, this type of pump has shown itself to be particularly adapted for operating a heavy ram where it is necessary to vary the maximum working pressure and to hold the work under load for some time.

Figure 3 is a schematic of the hydraulic circuit. The four-way directional control valve plunger was selected to permit the pump to by-pass in two of the three positions. In position I, ports 1 and 3 and ports 2 and 4 are connected. The single acting ram will return by counterweight to its fully open or retracted position and the pump is by-passed. In position II, the center position, the ram will stop when ports 1, 2 and 3 are connected and port 4 blocked. In this position also the pump is by-passed. In position III, the power position, ports 1 and 4 and ports 2 and 3 are connected; the press ram advances, pressing the wheels on the axle shaft.

A working pressure is pre-set by means of the pressure adjusting screw; pump displacement is reduced automatically when this pressure is reached. The reduced pressure is sufficient to hold a given pressure indefinitely.

Before being placed in the press, wheels are inspected and gauged for out of round, flatness spots and OD on an air-operated gauging jig shown in Figure 4. Minor irregularities are ground out; large imperfections are cause for rejection of wheels and their return to the foundry. The jig shown was devised and built in the shop; its inspection speed enabling one operator to gauge and mark wheels at a rate to keep the press in full production.

Fig. 4. An air-operated inspection and gauging jig is used to check irregularities in wheel surfaces. The workman is identifying an irregularity disclosed by the master gauge ring resting on a wheel.

We Interview a Scraper Engineer

EARTHMOVING EQUIPMENT IS FAST BECOMING one of the largest fields of application for hydraulic power and control. We wanted to learn when, where and why oil power came into use. To present a first hand report from an engineer with 40 years experience in the field, AH went to W. J. Adams of Euclid Road Machinery Company.

Bill Adams has been working with scrapers since 1906. Before joining Euclid in 1946, he had been with Continental Scrapers, R. G. LeTourneau, U.S. Ordnance Department and Bucyrus-Erie. He has pioneered in the design and manufacture of earthmoving equipment. At Euclid he has introduced new hydraulic designs including the present 4-wheel drive scraper.

AH: The machine builder today can choose from four or five methods for his power supply. What has the scraper builder done in the development of a suitable power source?

Adams: Since the late twenties, several scraper power control means have been designed and built; such as high pressure air, high pressure oil, mechanical drive, electric control and cable or wire rope units. Before long, high pressure hydraulic, for the smaller land leveling units and cable wire rope control for the larger construction scrapers became the accepted scraper power control method.

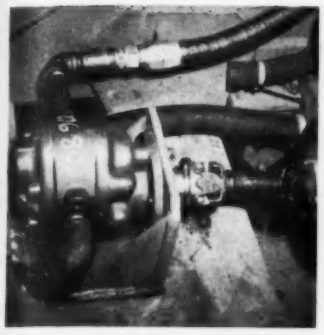
AH: Is oil power then limited to lightweight scrapers?

Adams: Not today, in 1947 when the Euclid Road Machinery Company designed and developed their present large capacity twin-drive and single engine scrapers, high pressure oil was chosen to power and control all scraper action. The gradual development of better pumps, control valves, cylinders and hose made this choice practical.

AH: What advantages have been gained by using oil power?

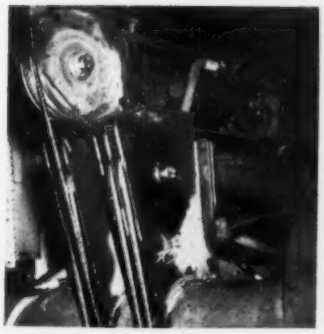
Adams: There are many advantages, first, hydraulic power control allows for separate, independent, positive and complete control of all the scraper actions, in a simple and low cost set-up. For example, the oil control of the front apron and the rear ejector bowl has replaced the bothersome one-line "Common Means" necessary on cable power control scrapers.

Second, we get a simpler and more compact



A gear type pump is driven through universal joints from the tractor engine drive shaft supplying pressure oil through flexible tubing to . . .

. . . the four way valve which is mounted on the side of the reservoir. The positions of the valve; hoist, lower or float and hold are controlled by levers from the tractor operator's seat. He controls the . . .



. . . four hydraulic hoists. The three hoists mounted above the scraper directly behind the tractor are shown. Two interconnected, cable multiplying hoists lift the scraper bowl. The third hoist lifts the front apron. Inside the bowl is an ejector cylinder.

power package, in contrast to the heavy and bulky standard two-drum cable unit. The pump can be direct connected to the tractor engine which allows for control of all scraper actions at all times.

Third, safety release, or means of controlling over-loads on the entire hydraulic system and scraper structure is quickly available.

Fourth, simple and safe "float" control of the scraper bowl, front apron and ejector is now possible.

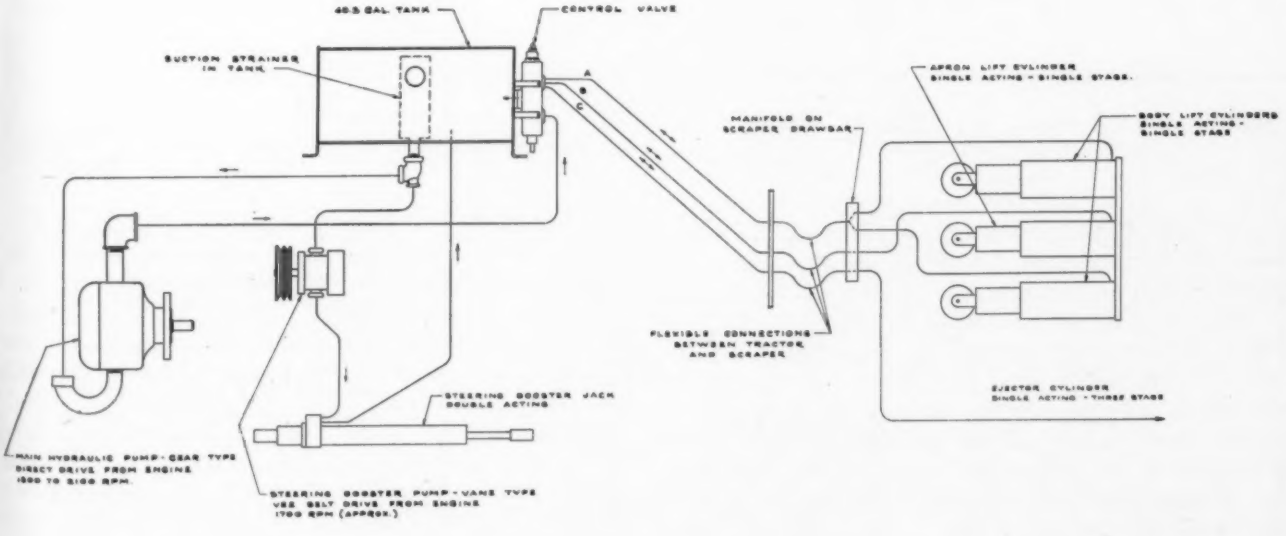
AH: Earthmoving machines are often abused, requiring field maintenance. Is field maintenance on hydraulic equipment easily accomplished?

Adams: Yes, because using hydraulics has permitted standardization and interchangeability of many parts and assemblies between scrapers and other earthmoving equipment. Parts are readily available and easily installed.

AH: Are there many tractor-driven machines

(Concluded on page 59)

Schematic layout of the hydraulic system. A manifold distributes oil to the two body lift cylinders, the apron lift cylinder and an ejector cylinder. A relief valve, which is built into the control valve housing, is set for 1250 psi. The hydraulic steering booster system assists the operator to easily maneuver the scraper.


40.5 GAL. TANK
CONTROL VALVE
SUCTION STRAINER IN TANK
APRON LIFT CYLINDER SINGLE ACTING - SINGLE STAGE.
MANIFOLD ON SCRAPER DRAWBAR
BODY LIFT CYLINDERS SINGLE ACTING - SINGLE STAGE
FLEXIBLE CONNECTIONS BETWEEN TRACTOR AND SCRAPER
EJECTOR CYLINDER SINGLE ACTING - THREE STAGE
STEERING BOOSTER JACK DOUBLE ACTING
MAIN HYDRAULIC PUMP - GEAR TYPE DIRECT DRIVE FROM ENGINE 1800 TO 2100 RPM.
STEERING BOOSTER PUMP - VANE TYPE V-BELT DRIVE FROM ENGINE 1700 RPM (APPROX.)

6 Steps To Si

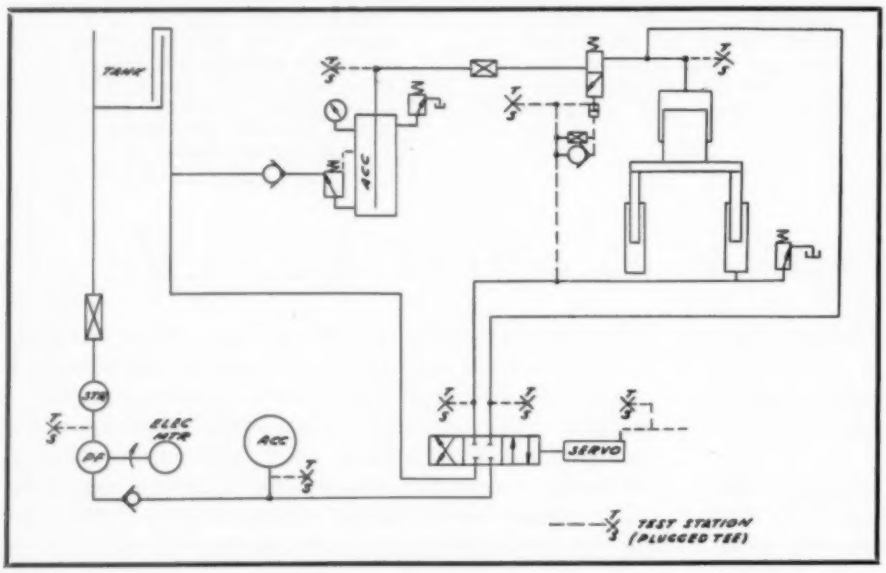


Fig. 1. This down closing press circuit illustrates the application of tees and pipe plugs for test purposes. Pressure gages may be inserted at any test station to rapidly analyze circuit problems. Provide enough test outlets in your system.

A MAINTENANCE SUPERVISOR MIGHT DEFINE THE WORD "DOWN-TIME" SOMETHING like this. Down-time is composed of the micro-seconds during which production is halted for even the most obscure reason. The cost of down-time becomes really serious where several large steam-drop hammers, hydraulic manipulators hydraulic pusher furnaces, trimming presses and auxiliaries are idle. Hydraulic machinery, as we have applied it in the hot working of metals, carries a grave responsibility for the continuity of production. Since the cost of down-time has assumed a very important position in the economy of production, we have established a number of practices to safeguard against and to minimize the duration of down-time in our plant.

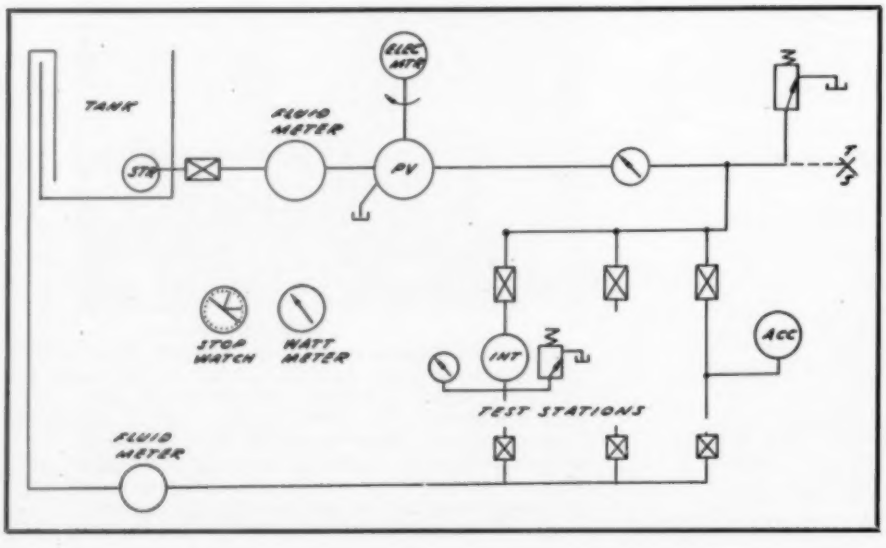


Fig. 2. A test bench circuit facilitates adjustment, break-in and efficiency checks for pumps, and permits the adjustment for opening or closing pressure of valves. Build a test bench to supply the pressure and volume requirements to meet your testing needs.

To Simplify Maintenance

By S. J. KILLA
Hydraulic Maintenance Supervisor
The Ladish Co.

1 **Maintain an up-to-date file of circuit diagrams, part drawings and data sheets.**

The office is the best place in which to inaugurate the program of economical hydraulic maintenance. A purchasing department is a logical place to originate the company's request for data sheets, packing lists, parts drawings and hydraulic circuit diagrams. We have found the vendors, who supplied our hydraulic equipment especially cooperative with us in our efforts to maintain a complete up-to-date file. There is a strong tendency on the part of many mechanics to memorize the function and adjustment of the equipment in their care. This practice of working from memory is extremely dangerous in high pressure work since the same valve can be used in the opposite manner on different machines. A globe type or spindle valve which in one circuit might require pressure above the seat and in another circuit might require pressure below the seat is a good example of the importance of proper installation of the same valve. A check valve and a differential piston type valve are also examples of valves having more than one direction of application. It is a good rule to make a complete file readily accessible to the maintenance personnel and encourage them in the proper use of its contents.

2 **Provide a sufficient number of convenient test outlets for pressure gages in a system.**

The best tool for the rapid discovery of hydraulic trouble is the pressure gage. We provide enough places to install it in the machine circuit, Figure 1. The circuit drawing in the shop file should give adequate information about the pressures in all parts of the machine. Enough forged steel tees with steel pipe plugs will provide convenient outlets for a test gage when looking for trouble or checking the machine performance. A clamp type ammeter will enable the electrician and the hydraulic repair man to get together on the correct pressure setting for any unit without overloading the drive motor. A plant having a large number of gages will find it a good investment to own a dead weight tester, while a special test gage for comparative work will suffice for most applications.

3 **Periodically sample and test the hydraulic fluid.**

If the hydraulic system is operated with oil as the fluid, periodic sampling and testing of the oil is imperative. There are many schools of thought on the subject of filtration, and each application presents aspects that make it unwise to recommend a uniform method of handling the subject. One of the problems in hydraulic maintenance is the handling of oil. We have presses with reservoirs thirty feet high which hold 800 gallons of oil. For emergency work we keep a supply of empty refinery-candled steel drums readily accessible. For filling reservoirs, an inexpensive steel tank of about 60 gallons capacity and capable of holding plant air line pressure may be used to force the oil up into the presses. Scheduled checks on the chemical condition of both oil and oil-water solutions in hydraulic systems are worth-while. When necessary the oil is removed from the system and reclaimed under laboratory direction.

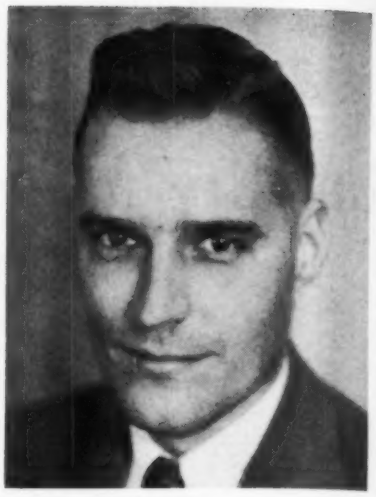
4 **Build a test bench for maintaining and checking valves and pumps.**

Pump maintenance requires a test bench, Figure 2, to facilitate adjustment, break-in and efficiency checks without interference with production. A 25 horsepower reversible motor mounted on an adjustable base will handle pumps up to 200 horsepower in size if the pressure, volume, or both are regulated to suit the motor size. A voltmeter should be attached to the motor and a fluid meter attached to the pump where checking pump performance by means of a stop watch. Running meters attached to the electric motor circuit provide a good means of establishing

(Concluded on page 75)

F. P. Hansen
"Utility of Hydraulic Power in Farming with Track Laying Type Tractors"

O. J. Maha
Director of 1950 Conference



Don Strandberg
"Hose Assemblies and Related Fittings"

National Conference on Industrial Hydraulics

FINAL ARRANGEMENTS ARE BEING MADE FOR THE sixth annual National Conference on Industrial Hydraulics, which will be held on Wednesday and Thursday, October 18 and 19 at the Sherman Hotel in Chicago. In anticipation of a record attendance the two day conference will hold concurrent meetings for the first time. A total of 20 papers are on the agenda.

Luncheon meetings will be held both days and a banquet will be held on Wednesday evening.

The American Society of Agricultural Engineers will act as the eighth cooperating technical society (the list of the first seven were given in the preliminary announcement of the conference in the September issue of APPLIED HYDRAULICS, page 19) for the conference which from the beginning has been sponsored by the Armour Research Foundation of Illinois Institute of Technology and the Graduate School of the Institute.

The first morning, Wednesday, will be given over to registration and a general session. Concurrent sessions will be held Wednesday afternoon and both morning and afternoon on Thursday. This will make it possible for those who attend to sit in and participate in sessions of specific interest. It will also permit more discussion of individual papers. Field sales and service men, dealers and distributors, as well as executives, designers, process and production engineers will be able to spend two full days to maximum advantage.

The sectional plan also encourages the growing tendency of leading buyers and users of hydraulic equipment to send groups of their technical men to the conference.

PROGRAM

Wednesday morning, October 18, 1950

Subject: GENERAL SESSION

"Hydraulic Control Problems in Automotive Transmissions", by R. L. Smirl, Borg and Beck Division, Borg-Warner Corporation, Chicago, Ill.

"Operation and Care of Hydraulic Machinery", by J. C. Van Gundy, The Texas Company, New York, New York.

Wednesday afternoon, October 18, 1950

Subject: AERONAUTICAL HYDRAULICS

"Aircraft Hydraulic Equipment Problems", by Carl W. Chambers, Douglas Aircraft Company, Santa Monica, Calif. (There will be a five man panel discussion on this subject; suppliers as well as buyers (airframe) will be represented. B. R. Teree, hydraulic manager, New

York Air Brake Company, Watertown, New York, will act as moderator of the panel.)

"Cavitation in Piston and Gear Type Pumps", by R. J. S. Pigott, Gulf Research and Development Company, Pittsburgh, Pa.

Subject: CENTRIFUGAL PUMPS

"Volute vs Diffusion Casing for Centrifugal Pumps", by A. J. Stepanoff, Ingersoll-Rand Company, Phillipsburgh, New Jersey.

Subject: SPECIAL FLUID PROBLEMS

"Effect of Rate of Shear on Viscosity", by Sydney J. Needs, Kingsbury Machine Works, Philadelphia, Pa.

"Fluidynamics of Rubble Trays", by Glen S. Houghland and Warren C. Schreiner, M. W. Kellogg Company, New York, New York

Thursday morning, October 19, 1950

Subject: HYDRAULIC PRESSES

"Accummulator versus Self-Contained Pumping Unit", by J. J. Littley, Chicago, Ill.

"Large Hydraulic Presses in Germany before and during World War II", by A. Zeitlin, Hydropress, Inc., New York, New York

Subject: CIVIL ENGINEERING HYDRAULICS

"Hydraulic Dredging" by J. E. Yager, Bucyrus Erie Co., South Milwaukee, Wis.

"Large Sewage Pumps", by H. T. Sward, Fairbanks Morse and Company, Beloit, Wis.

"Operating Experiences with High-Head Gates and Valves", by W. G. Weber, Bureau of Reclamation, Denver, Colo.

Subject: HOSE AND FITTINGS

"Hose Assemblies and Related Fittings", by Don Stranberg, Anchor Coupling Company, Inc., Libertyville, Ill.

" 'O' and 'V' Rings", by J. H. Swartz, Linear, Incorporated, Philadelphia, Pa.

Thursday afternoon, October 19, 1950

Subject: AGRICULTURAL HYDRAULICS

"Utility of Hydraulic Power in Farming with Wheel-Type Tractors", by J. F. Ziskal, International Harvester Co., Chicago, Ill.

"Utility of Hydraulic Power in Farming with Tracklaying Type Tractors", by F. P. Hanson, Caterpillar Tractor Company, Peoria, Ill.

Subject: REFINERY HYDRAULICS

"New Developments in Reciprocating Pumps", by E. F. Wright, Worthington Pump & Machinery Corp., Harrison, New Jersey

"Application of Centrifugal Pumps", by A. E. Harnsberger, Pure Oil Company, Chicago, Ill.

Subject: CONTROL OF SURGES

"The Desurger", by John Howard Dawson, Oklahoma A. and M. College, Stillwater, Okla.

"Mechanical - Pneumatic Shokstops — Their Place in Relief of Liquid Hammer", by L. H. Kessler, Northwestern Technological Institute, Evanston, Ill.

J. J. Littley
"Accumulator vs Self Contained Pumping Unit"

J. C. Van Gundy
"Operation and Care of Hydraulic Machines"

J. H. Swartz
" 'O' and 'V' Rings"

Here's Production . . . . 3000 Rings an Hour!

By **EUGENE L. MACKEY**
The Yoder Company
and
ELMER F. HEISER
S. G. Morris Company

AIR AND OIL HAVE BEEN TEAMED TO PROVIDE power and control for a continuous production machine which forms pierces and cuts stainless steel strip stock into 3000 automobile headlight rings every hour of operation.

The machine was designed and built by the Yoder Company of Cleveland for the Electric Auto-lite Co., Lamp Division, Cincinnati.

Design of the pierce and cut-off circuit on this continuous production machine offers an interesting, practical combination of hydraulic and pneumatic components. Pressure oil provides the power for the working tools. Air pressure accurately applied by electronic timing of a solenoid-operated air valve, is the control medium for directing the pressure oil.

On the Yoder machine .030 x 1 1/32 in stainless steel stock is drawn from a reel by the feed and form rolls, Figure 1. The rolls form the short bend over, which is seen at the top of the finished ring. The stock then moves into the dies at the front end of the machine, Figure 2. Here the ring is formed over stationary bending dies, pierced, cut-off and dropped into a hopper ready for the joint welding operation.

Operating automatically,, 3000 parts per hour are produced, as the feed and form rolls move the stock through the machine at a speed of 95 fpm.

The hydraulic circuit shown diagrammatically in Figure 4 controls the pierce and cut-off tools. Figure 1 pictures all the components in the circuit. A two inch diameter hydraulic cylinder (1) having a ½ in stroke directly actuates the work punches. Timing of the punches is critical for the cylinder must cycle 50 times per minute, and strike the stock at the same point each time to produce a ring of uniform diameter and to prevent any stock distortion or jamming of dies.

Oil flow to the work cylinder is directed through a 4-way, closed center valve (4) which is positioned by the action of an air cylinder

Air Control for Oil Power Solv

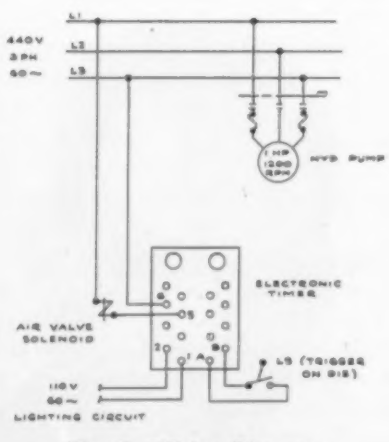


Fig. 3. Wiring Diagram

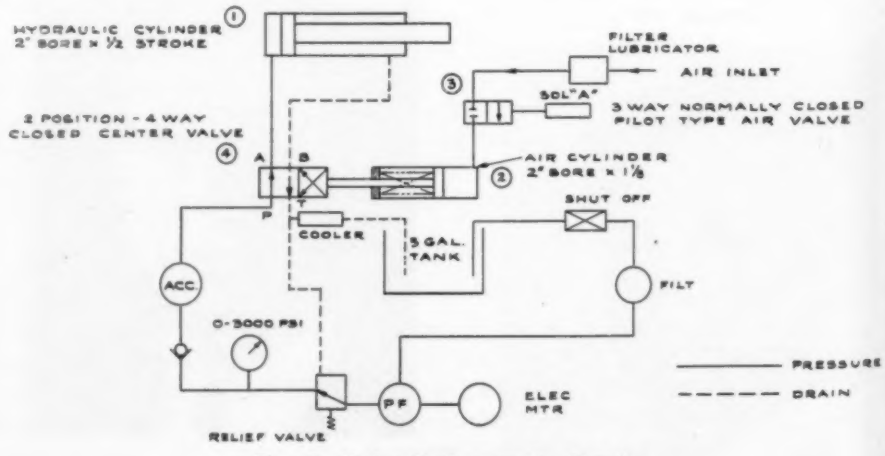


Fig. 4. Hydraulic-Pneumatic Circuit

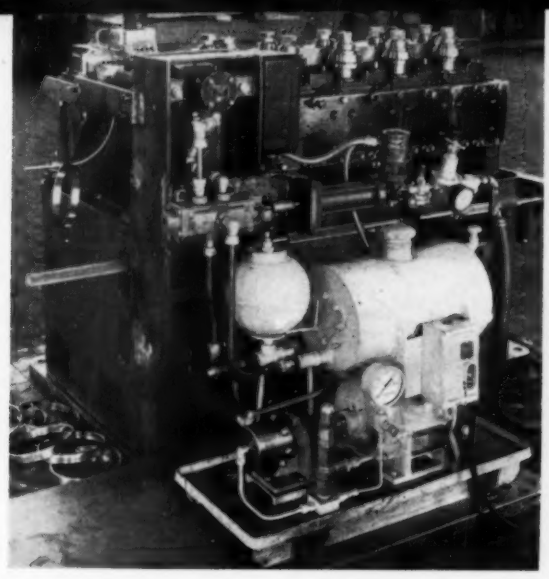
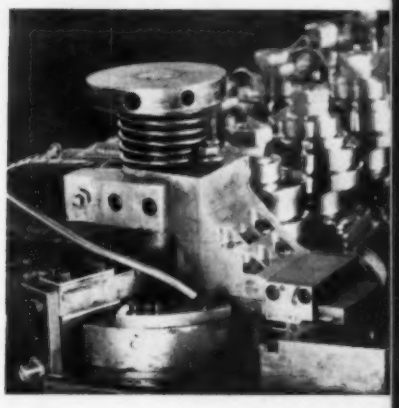


Fig. 1 (left) The complete hydraulic system for pierce and cut-off of the headlight rings. Note the closely coupled air cylinder for positioning the hydraulic four-way valve.

Fig. 2. (below) Close-up of the forming die and the pierce and cut-off tools.



(2). Why was an air cylinder and its accompanying solenoid-operated air valve (3), timing device and necessary air lines selected instead of a more compact direct solenoid or pilot solenoid valve? It was felt that the speed of operation and the number of cycles per minute would make direct solenoid-operation extremely doubtful. The final choice not only had to perform well but had to be free from repair problems. Pilot solenoid operation was questionable from the stand point of operating time, it was believed that the time lag, using a pilot type solenoid valve would defeat the purpose.

The 3-way, solenoid-operated, normally closed valve selected to control the movement of the air cylinder will operate in approximately 1/3 of a cycle (60 cycle current). That is, only 1/180 of a second will elapse between energizing the valve and building up air pressure in the cylinder port chamber. In view of the extremely high speed possible with the solenoid air valve and considering the expansion rate of air as compared to the flow of oil through pilot operation, all factors added up in favor of air operation.

It is well to point out here that pure reasoning was not used as background for the decision to use air for the control of the directional valve. In the past, direct solenoid hydraulic valves and pilot solenoid hydraulic valves have been tested and the speed of operation did not approach the speed obtainable using air equipment.

It was decided to use an accumulator in this system because direct operation from a pump would require a large pump with a considerable horsepower rating. Although the rate of flow at the time of cutting is quite high, the volume required for a cut is not very great. The use of

(Concluded on page 62)

ower Solves High Speed Problem

AT the start of the cycle the air cylinder (2) is retracted and the solenoid-operated air valve (3) is in its normally closed position, solenoid "A" is deenergized. The 2-position, 4-way directional valve (4) is directing oil from the pump through ports T and B to the rod end of the work cylinder (1), holding the pierce punch and cut-off dies in the retracted position and charging the one gallon capacity accumulator. When solenoid "A" is energized the air valve opens, supplying filtered and lubricated air to the blank end of the single acting air cylinder (2) to move directional valve (4). Pressure oil from the accumulator flows through ports P and A to the blank end of the work cylinder (1) to drive the pierce and cut-off tools through the work. Solenoid "A" is then deenergized, spring action returns air cylinder (2), moving the directional valve to retract the tools, and the cycle is ready to repeat.

The time interval for each cycle is dependent upon energizing and deenergizing solenoid "A". This interval is controlled by the action of a limit switch and an electronic timer. The wiring circuit is shown in Figure 3.

The limit switch is mounted at the die pivot and is actuated by the forward motion of the die. The limit switch energizes solenoid "A" to start the forward motion of the work cylinder. By the action of the limit switch, the timer is started and after a preset interval of .125 sec. the timer operates to deenergize solenoid "A" to return the work cylinder to the starting position.

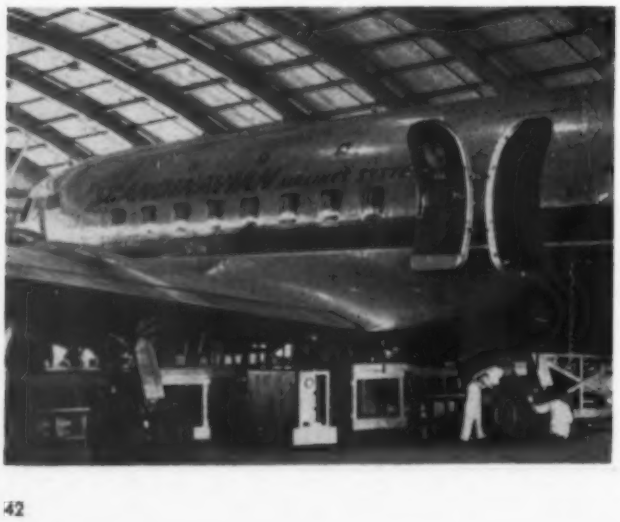
FRED O. HOSTERMAN
Advisory Editor

Mechanized Maintenance

By JULIUS KENDALL*

FEW OF US REALIZE HOW IMPORTANT A PART hydraulics plays in the successful operation of modern aircraft. Finger-tip controls, operated by the pilot, direct hydraulic fluid under pressure to raise the landing gear, close the wheel-well doors and actuate the flaps and flight control surfaces against tons of air pressure. Once the ship is airborne, the hydraulic system is called upon to provide comfort and safety for the passengers and crew. Windshield wipers, cowl and wing flaps, flight controls, automatic pilot, cabin pressurization and air conditioning systems are operated by the hydraulic system. With the airplane back on the ground, hydraulics again is called upon to provide power for steering the ship and bringing it to a smooth positive stop with its powerful hydraulic brakes.

Fig. 1. A standard portable testing machine, a "jeep" or "gig" to mechanics, in use testing the hydraulic system of a Scandanavian DC-6 airliner.



Credit for the amazing development in aircraft goes not alone to the airlines and aircraft manufacturers, but also to the accessories manufacturers who have developed more efficient instruments, flight control systems and accessories. When direct manual control of aircraft became inadequate it was hydraulics which came to the fore. The early systems were rather simple, consisting in the main of an engine or hand operated pump, a few valves, the actuating cylinders and related plumbing. Such a system was used for intermittent duty and the problems experienced were few and relatively simple.

As aircraft have grown larger and larger the hydraulic system has become progressively more complex and operating pressures have increased from a few hundred psi in early systems to the 3000 psi circuits currently in use.

As the performance requirements of the hydraulic system grew, it soon became necessary to establish definite periodic inspection and test schedules. Positive performance of the hydraulic system and its components became a "must" in order to insure the safety of passengers and crew. Self regulation by the airline operators, in cooperation with federal agencies, set up definite safety regulations calling for periodic mantenance

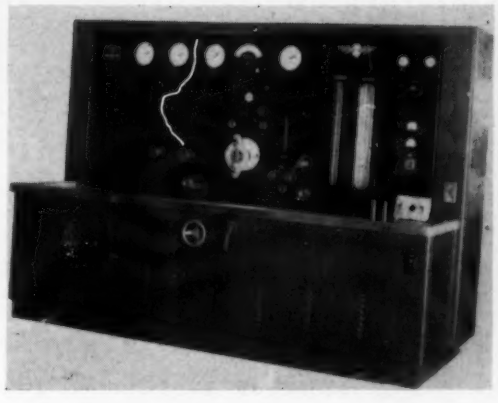


Fig. 2. A typical test machine used to test hydraulic pumps. This test machine incorporates all necessary components to test any model hydraulic pump. A variable speed hydraulic drive is used to drive the pump under test. The drive is equipped with a reversing valve to handle clockwise or counterclockwise rotation pumps and an electric tachometer to indicate pump speed. The test circuit includes an oil reservoir incorporating an automatic temperature control unit, a supercharger pump to supply oil to the pump at a required pressure, suitable flowmeter, leakage meter, temperature and pressure gauge on both the pressure and return sides of the pump, filters, a time of day electric clock, an electric timer and a suitable dc electrical outlet box for connection of motorized pumps. This machine provides the operator with all the necessary equipment to test the performance of new or newly overhauled hydraulic pumps.

and testing of aircraft systems and components.

Aircraft inspection and maintenance of one airline alone is a tremendous job with countless details and requiring a wealth of trained men and equipment. To make certain that each airplane is in top flight condition at all times, the airlines have set up a system of inspections, overhauls and tests, the schedules of which are rigidly adhered to. Schedules vary with each airline but generally run as follows:

(a) Preflight Inspection
(b) Daily Inspection
(c) 25-hour Inspection
(d) 50-hour Inspection
(e) 100-hour Inspection
(f) Engine Change
(g) Plane Overhaul

These inspections are progressively more detailed and extensive. The importance of these inspections cannot be overemphasized because the detection and remedy of minor troubles as they occur will preclude malfunction or failure of the entire system.

Maintenance testing may be conveniently divided into two types:

(1) Line or System Testing, which is performed on the field or in the hangar and accomplished by the use of portable testing machines, "jeeps" or "gigs" to mechanics.

(Concluded on page 61)

Lockheed's Constellation Gets Its Landing Gear Checked

Here are detailed steps in the test procedure using a standard portable test machine:

(1) Support the airplane on suitable jacks
(2) Connect the pressure and return hose lines from the test "gig" to the special external connections provided on the airplane
(3) Open all manual globe valves in the landing gear wheel well and remove all landing gear safety pins
(4) Move landing gear selector lever to the "up" position. Open valve to system on gig. All downlocks shall unlock and gears shall retract to the "up" and locked position. Flow shall be maintained at a minimum of 22 gpm and 1600 psi during retraction operation
(5) Move landing gear selector lever to the "down" position. All uplocks shall unlock and the gears shall extend to the full "down" and locked position
(6) Check that all gears are down and in locked position with safety pins in place. Remove safety pins from left main gear. Move landing gear selector valve lever to "up" position. Raise left hand main gear. Make sure it is in the fully locked position. Leave gear in this position under pressure for 15 minutes. Gear must remain "locked" in "up" position
(7) Repeat step 6 on right hand main gear
(8) Repeat step 6 on nose gear
(9) Move hand pump selector lever to emergency extension position
(10) Move landing gear selector to "down" position
(11) With landing gear in "up" and locked position, operate the hand pump. Uplock shall unlock and gear shall move to "down" and locked position. Move hand pump selector to emergency brake position. Start "gig" and apply pressure to the secondary system, permitting the actuating cylinder shuttle to move across to normal extension position for proper return of oil to main reservoir during retraction
(12) Refill landing gear emergency extension reservoir to level of filler lip and close scupper drain valve. Check main reservoir for proper oil level and add or drain oil if necessary
(13) Replace safety pins in all landing gears and place all safety globe valves in open position
(14) Disconnect and remove test "gig"
(15) Lower plane to ground.

HERE'S HOW

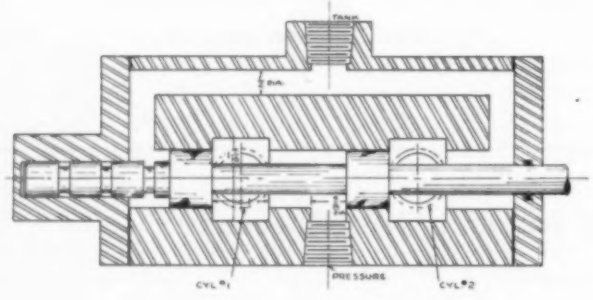
- PREVENTIVE MAINTENANCE
- SERVICE PROCEDURES
- MODERNIZATION
- SHORT CUTS

Directional Valve for 10,000 PSI

ONE OF THE PROBLEMS CONFRONTING USERS OF hydraulic pumps which are capable of reaching 10,000 psi, is the availability of directional control valves that will operate satisfactorily at this pressure.

The two stage system, used in Wroble Engineering Co. presses has a radial piston, high pressure pump for the working stroke together with a large volume gear pump for rapid advance. A four-way open center valve could handle 10,000 psi and a flow rate of 15 gpm is required for this system.

It was preferable to buy the required valve from a regular manufacturer, but no valve could be found to meet the requirements. Double acting control valves developed by an English firm are for continuous operation at 7,000 psi and are of packing-less design. The valve is very suitable for controlling the radial piston pump up to this specified pressure. The commercial limits of the clearance between the bore and the sliding piston are between one and four microns per inch of bore diameter. A micron is equivalent to approximately 40 microinches.



It appears logical that a conventional piston type of slide valve for 10,000 psi operation would require a clearance of 20 microinches or better, a precision beyond practical shop tolerance. Changes in oil temperature or deformation of the valve body under high pressure would take up this micro-small clearance. At the high pressures involved, the clearances specified by the English valve manufacturer would seem to cause binding and prevent actuation by simple lever means. However, this is not the case, for the manufacturer points out very suuccessful operation of their valves on a large number of hydraulic presses. Nevertheless, it does not seem practical to try to extend the pressure range of a conventional, precision fit slide valve for operation at 10,000 psi.

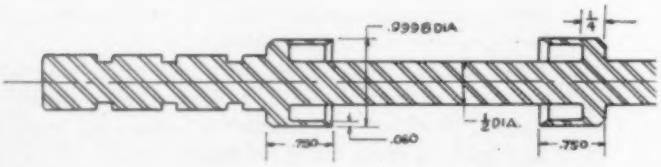
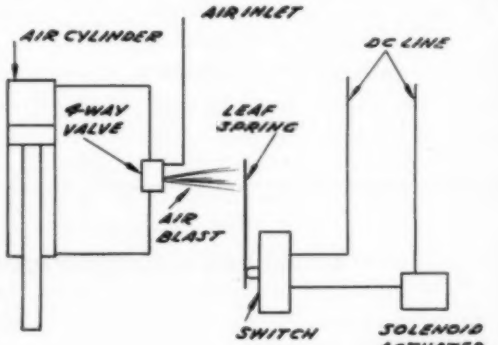


Figure 1 shows a section through a 10,000 psi, 17 gpm four-way control valve, designed by Wroble Engineering Co. for hand control and cycling of power cylinders for high speed oil-presses. This valve operates exactly like a conventional slide valve, except for the packing-less means of sealing. Instead of relying only on close clearance for sealing, the opposed lobes are undercut to form annular lips, Figure 2. Upon an increase of pressure above 2000 psi the annular lips expand to reduce the clearance to zero. Pilot model tests indicate that above 2000 psi to 10,000 psi the valve ran dry. The operating force increased continuously above 2000 psi, and at 12,000 psi the lever could not be operated by hand.

WOODROW L. WROBLE
Schenectady, N. Y.

Air Exhaust Actuates Solenoid

BY USING A MICRO SWITCH IN THE SOLENOID LINE, the air blast from the exhaust of an air cylinder is properly timed and located to trip the micro switch and actuate the solenoid. The set-up where this idea is used has an air cylinder, controlled by a 4-way valve moving blanks from the bottom of a hopper to



a notching die. The parts in the hopper are agitated by the action of a solenoid. The travel of the air piston trips dogs to move the 4-way valve. The exhaust port on the valve is located near the leaf spring of the micro switch. A blast of exhaust air trips the switch to actuate the solenoid in the hopper. The solenoid which moves on both the forward and return stroke of the air cylinder, is spring returned.

K. J.

Air Control For Press Clutch

THIS CIRCUIT PROVIDES COMPLETE AIR CONTROL FOR a press clutch on production work and for inching during set-up work. For the "on" position the operator enages valve 1; air is directed from the compressor through ports P to A to the left side of main valve 2, moving the spool of valve 2 to direct air from R to B to the clutch. When the shaft makes a revolution, a cam opens valve 3. Air is then directed through ports B and C in inching valve 4 to the right side of main valve 2. This reverses the main valve, cuts off and exhausts the air supply to the clutch and stops the machine.

When a set-up is made and inching is required, manual inching valve 4 is reversed blocking port S to isolate cam valve 3. Line air is directed to ports C

(Concluded on page 66)

International Amphitheatre—Scene of the 32nd National Metal Exposition and Congress

NATIONAL METAL SHOW
October, 23-27

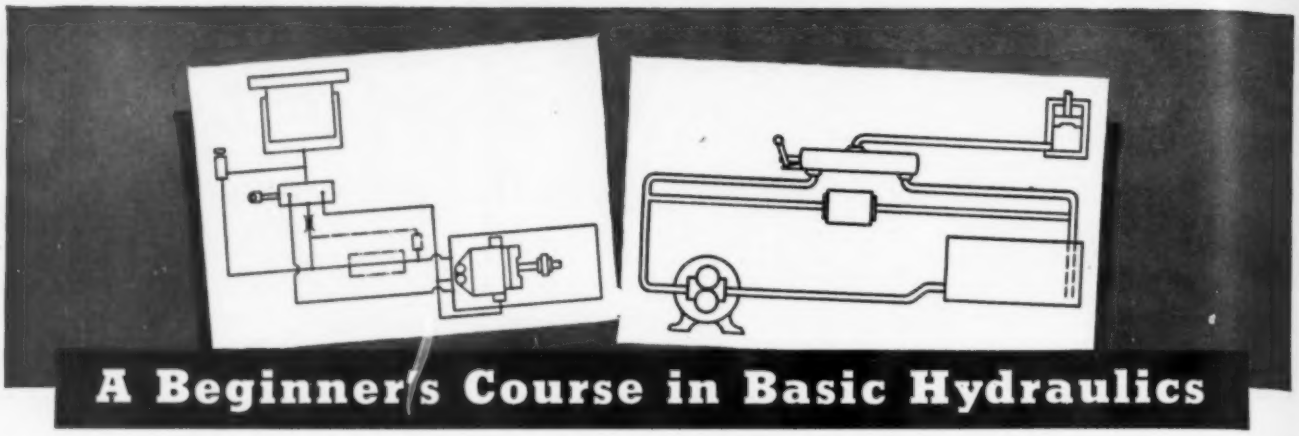
THE 32ND NATIONAL METAL CONGRESS AND Exposition will be held at the International Amphitheatre in Chicago, October 23-27. With over 350 exhibitors occupying more than 200,000 square feet of floor space, the Exhibition will be one of the largest ever held and a record attendance is expected. The general theme of the Congress and Exposition, "Materials and Equipment for High Production" will be carried through many of the exhibits, the business meetings and a number of the technical sessions.

Some important business meetings will be held during the week. The American Society for Metals will hold a Business Forum in the grand ballroom of the Palmer House on Thursday, October 26. Producers of raw materials will report on the prospects for a continued high level of output, the needs and opportunities for expanding plant facilities, and on some of the critical implications of domestic and foreign supply under present world tension.

The ASM will hold two Sales Clinics, the first on Sunday evening, October 22. An outstanding sales executive will address this meeting assisted by a panel of business paper publishers and editors. The subject will be the problem of How to do the Best Job of Selling through the Medium of Industrial Exhibits. The second Sales Clinic will be held on Tuesday morning, October 24 at 9 o'clock. This meeting, with outstanding authorities leading the discussion, will be devoted to the practical side of selling, with selling and marketing problems within the metalworking field given special emphasis.

Here Are Some of the Exhibits You Should Not Miss

Company	Booth
American Brake Shoe Company	2024
Babcock & Wilcox Tube Co.	2609
Baldwin Locomotive Works	407
Bendix Westinghouse Automotive Air Brake Co.	2021
Brown Instrument Division	1802
Brush Development Company	2536
Buehler, Ltd.	615
Bundy Tubing Company	507
Chicago Metal Hose Corporation	714
Cities Service Oil Company	1903
Clinton Machine Company	201
Commercial Shearing & Stamping Co.	2115
Crane Packing Company	2106
Fawick Airflex Co., Inc.	1521
Goodrich Co., B. F.	2007
H & H Tube Mfg. Company	1707
Houghton & Co., E. F.	920-925
Lindberg Engineering Company	1204
Morganite, Inc.	2737
Ohio Seamless Tube Company	109
Partlow Corporation	818
Raybestos Manhattan, Inc.	2130
Rockwell Manufacturing Co.	2701
Schrader's Son Div., A. Scovill Mfg. Co., Inc.	518
Shell Oil Company	315
Socony-Vacuum Oil Co., Inc.	2510
Sperry Products, Inc.	228
Stokes Machine Co., F. J.	420
Superior Tube Company	2435
Texas Company	1906
Union Carbide & Carbon Corp.	901
Westinghouse Electric Corp.	622
Wheelco Instruments Co.	1909
Worthington Pump & Machinery Corp.	506



A Beginner's Course in Basic Hydraulics

Chapter VII

DIRECTIONAL VALVES

Part 4

Prefill, Back Pressure and Sequence Valves

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Prefill valves. The prefill valve is used to permit oil to flow into and out of cylinders at low pressures. It is so-called because it is a convenient means of filling the cylinder during the first phase (rapid traverse or approach) of the work action when the work plunger is being moved rapidly to the point of work by gravity or other means. The reservoir is normally above the valve and cylinder so that oil will flow by gravity and atmospheric pressure into the cylinder. This arrangement is shown in Figure 105. The advantage of this arrangement is that a small volume pump can be used to do the work instead of a large pump that would otherwise be required if all the oil to fill the work cylinder had to be furnished by the pump.

When the plunger or ram reaches the work, the valve closes, the pump takes over for the power or work stroke. Obviously, a large volume pump would be inefficient for the relatively short power stroke.

Fig. 105. Arrangement of surge type of prefill valve with no provision for discharge at high speeds.

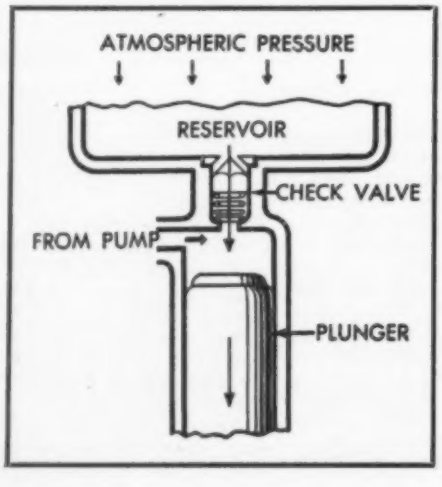
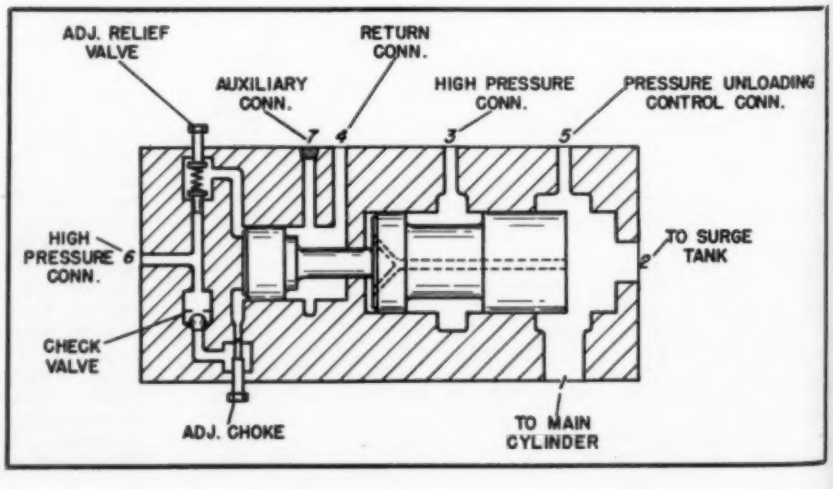


Fig. 106. Schematic of an Oilgear surge valve used to provide high speed traverse and return on modern presses.



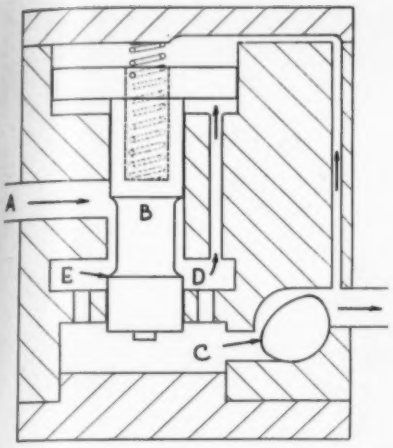


Fig. 107. Schematic design of a back pressure valve. The unit shown is a Vickers flow control valve with an adjustable metering orifice.

The prefill valve may be either of two types, surge or pilot operated. In the surge type (Figure 105), the check valve is opened by atmospheric pressure acting on the free surface of the oil in the reservoir and the flow of oil is accelerated by a partial vacuum which is set up inside the work cylinder as the plunger descends. In this type, the check valve is closed by its spring when the plunger comes to rest or when the pressure in the work cylinder has risen sufficiently. In the pilot operated type, the valve is opened by oil from a branch circuit and closed by this branch or by a spring.

With the equipment shown in Figure 105 it would be necessary for the plunger to return upward at slow speed because all of the oil would have to go back through the pump. For modern high speed cycles, surge valves of the type shown in Figure 106 are used.

A large plunger connects the main cylinder to the oil reservoir while the oil from the pump moves the main ram downward through one or more booster rams until the main ram reaches an unyielding subject or the resistance increases to a preset pressure. As soon as the preset pressure is reached, the oil from the pump directly to the main cylinder for the maximum tonnage operation. When the main ram is to be reversed, oil from the pump quickly opens the large plunger so that oil from the main ram can return directly to oil reservoir as the booster ram raises the main ram at high speed.

Back pressure valves. Back pressure or balancing valves are used to keep exhausting oil from a cylinder under sufficient pressure so that the piston will move at a constant rate of speed as external load resistance varies. They are used in preventing gravitational drop of a vertical pitson or to set up a back pressure in the exhaust end of a double acting cylinder. In the latter case, for example, a cylinder driving a drill head will not jump ahead when the drill breaks through the work. Most back pressure valves function similarly to relief or safety valves.

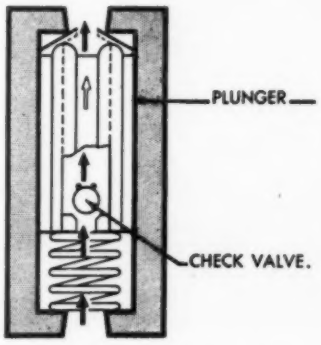


Fig. 108. Cross section of a non-adjustable sequence valve.

Figure 107 is a schematic view of a back pressure valve. The valve is a Vickers flow control valve with an adjustable metering orifice that restricts the flow of oil from the cylinder. A pressure reducing valve keeps the pressure on the orifice constant so that the rate of piston travel is also constant.

Oil from the cylinder enters at A, flows past piston seat at E and adjustable metering orifice C. Pressure builds up equally at orifice C and bleed hole D. Pressure through bleed hole D is exerted on the under side of the piston head, moving piston B up to restrict flow between B and E. When pressure on the orifice drops, it also drops equally on bleed hole D, permitting piston B to descend and restore the original flow from A past piston seat at E.

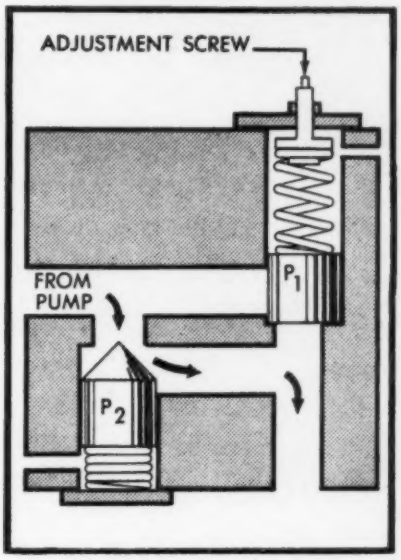
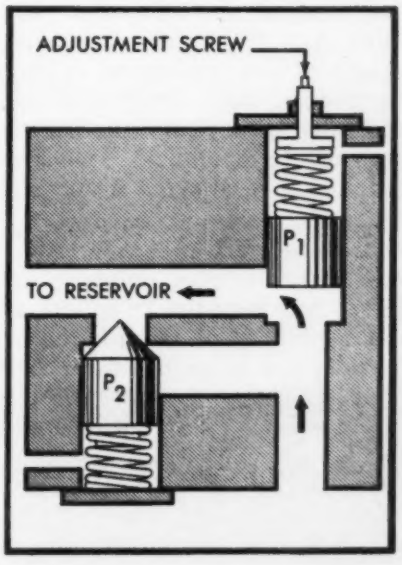


Fig. 109. Supply or feed path of oil through an adjustable sequence valve.

Sequence valves. Sequence valves are pressure operated valves that permit free flow in one direction and a restricted flow in the opposite direction. They control the timing or sequencing of flow to the branches of a circuit. It is frequently necessary to start or stop a related or auxiliary movement in a cycle in a definite time relation to other movements.

(Concluded on page 76)

Fig. 110. Return path of oil under back pressure through an adjustable sequence valve.



This 12,000 pound plow made with three, four or five blades, 44 inches in diameter from 5/8 thick steel, can plow a furrow 30 inches deep. Hydraulic raising of this heavy implement has made the plow easily manageable on any slope of field. One man, the tractor driver, can control the plow from the tractor seat, and easily move the implement from field to field. With hydraulics . . .

You Can Make Your Product Bigger

. . . where extreme weight is needed to do the job.

Developed by Towner Manufacturing Co., Santa Ana, California, it was found that extreme weight of the implement is necessary to perform the deep tillage. Previous experimental models weighing 6,000 pounds and using 36 in disc blades were too light and not strong enough to provide the desired tillage. This great weight made hydraulic design a necessary feature, for any mechanical lift would result in an unwieldy wheel and ratchet combination. The hydraulic design has resulted in quick, accurate operation, and simplicity of manufacture and maintenance.

The plow is so balanced that under ordinary circumstances the front and rear of the plow may be raised together. Two 5 in bore, 24 in stroke hydraulic rams, operated on 450 psi to 600 psi pressure oil, supplied from the hydraulic system on the pulling tractor, give a total thrust of 4½ to 6 tons per cylinder. The cylinders may be controlled to raise or lower the front and rear of the plow independently of each other.

The two rams are mounted directly over the two furrow wheel posts, thus avoiding any eccentric loads on the shaft. On the extending stroke of the ram, the post is forced down through the bearing housing, lifting the right hand side of the plow. By lifting only one side of the plow, the vertical pitch of the furrow wheels necessary in the plowing operation is taken out to transport. The 24 in stroke makes possible not only a 12 in transport clearance, but also an additional amount to allow for roll back of the soil under the furrow wheels, proper contact of wheel with furrow wall, and loading the blades with the weight of the wheel.

With the giant disk plow, farmers in western plains are now practicing a deep tillage method that is stabilizing the sandy soil and offering them a "one-seed" crop that will harvest and not necessitate replanting.

"No Feather Bedding On This Train

HYDRAULIC circuits involve fewer moving parts—can be arranged and mounted to occupy less space in "hard-to-get-to" locations.

On every run extra payload is a reality with this train of heavy duty side dump trailer wagons. Side dumping lets the train roll up, dump and roll on—no need for lost time in turning or backing.

National Metal Show
International Amphitheatre
Chicago
October 23-27, 1950

Booth 2115

The operator in the tractor cab manipulates a 1¼" heavy duty balanced spool control valve to cycle (raise — hold — lower) the 7" twin three sleeve telescopic cylinders. Power is generated by a gear type pump developing 52 G.P.M. discharge (1250 R.P.M. — 1000 P.S.I.). The entire circuit is oil hydraulic — the equipment "Commercial" hydraulics.

"Commercial" is the World's largest producer of oil hydraulic telescopic cylinders.

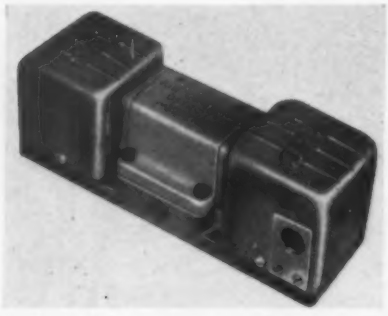
WRITE FOR DETAILED DESCRIPTIVE LITERATURE

QUALITY IN EVERY TURN

The COMMERCIAL SHEARING & STAMPING COMPANY
YOUNGSTOWN 1, OHIO.

application and performance of NEW COMPONENTS

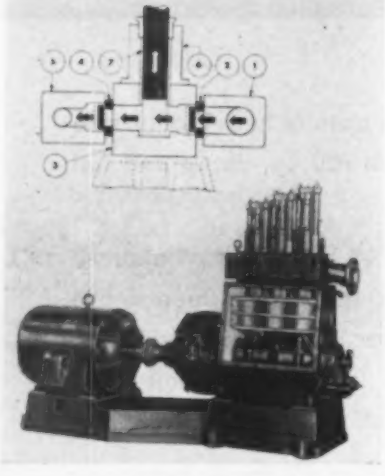
SOLENOID AIR VALVE—Addition of a momentary contact double solenoid operated 4-way valve to the Mechanical Air Controls, Inc. line is announced.



Application is for the operation of double-acting low pressure hydraulic or air cylinders where pressure is held on one side of the cylinder for a peroid of time. Basically used in safety control, the valve is reversed by momentarily energizing a solenoid. Thus the cylinder is held in positive position without the necessity of holding either solenoid energized. Power failure will not reverse the valve or cylinder.

This type valve is available in ⅜ and ¾ in full orifice size, with the option of any size pipe taps in the base. The one moving part in the valve body consists of an aluminum alloy hard-chromed spool, on which "MAC" patented seals have been mounted to give positive "sealed with pressure" contact with the body bores. There are no springs in the construction.

Circle 101 on Reader Service Card

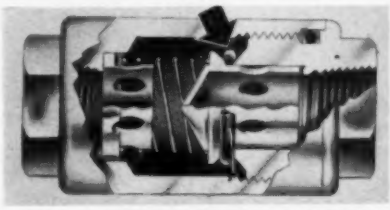


DIRECT FLOW PUMP — Direct flow principle in pump design, introduced by The Aldrich Pump Company, features a major revision in construction. The design results in a reduced volume of space between valves which makes possible a higher volumetric efficiency. It employs a sectionalized fluid end, composed of separate units which include the working barrel, stuffing boxes, valve units, plunger, and suction and discharge manifolds.

The suction (1) and discharge (5) manifolds are separate units which are bolted to the forged steel working barrel (3). The valve assemblies (2 and 4) and valve seats, which are held in place by the manifolding, are easily accessible. The stuffing box (6) is removable to permit adapting other size plungers (7) to the pump. Note that the pumping fluid flows through in direct line without being diverted. In performance tests, direct flow pumps have operated with a volumetric efficiency of 96 percent. Close clearances give high efficiency with light as well as heavy liquids.

Circle 102 on Reader Service Card

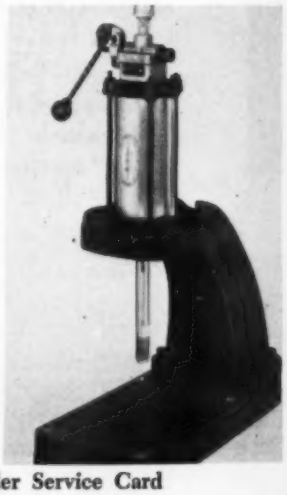
CHECK VALVE—Leak proof CIRCLE SEAL check valves are now being made available by James-Pond-Clark as standard catalogue items in a full range of sizes from ⅛ to 1 in NPT. Two models are available, designed for standard (0 to 300 psi) and very low pressure systems (0 to 1 psi) both are poppet type using an "O" ring seal. Absolute sealing, minimum flow resistance, and leakproof dependability for pneumatic and hydraulic systems are features of the new line.



This check valve is bubble-tight in leakage tests, providing absolute sealing at any differential pressure. An added feature of the design is quick opening and positive closing at extremely low pressures. Opening pressures are as low as 1 psi differential in the standard pressure types and 4 in water column in the low pressure types. Poppets close at zero flow before return flow starts.

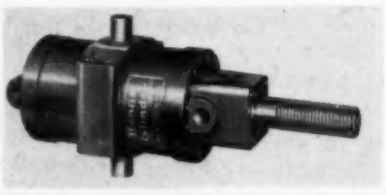
Circle 103 on Reader Service Card

AIR MOTOR ARBOR STAND — Converting a standard air motor into a sturdy air press suitable for a wide range of light to medium pressing operations, the Bellows Co. has brought a new unit, which can be used for such operations as riveting, stamping, staking, pressing, marking and assembling. The interchangeable base feature eliminates the necessity for a new set-up operation each time a job is changed. Fixtures can be left mounted on separate bases and the base used interchangeably as production requires.



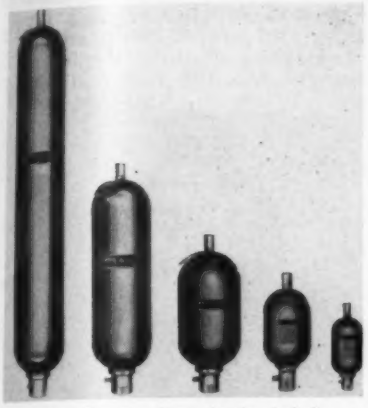
Circle 104 on Reader Service Card

HYDRAULIC CYLINDER—Newest design and construction features are included in the hydraulic cylinders manufactured by the Hanna Engineering works. The cylinder illustrated is Model HP-17, one of a complete line of Hanna high pressure hydraulic cylinders meeting JIC standards. Designed for working pressures up to 1500 psi, HP cylinders are used for smooth efficient push, pull, lift, press, clamp or control power in hundreds of applications. Eight standard mounting styles are available, with units to meet every mounting requirement.



Circle 105 on Reader Service Card

ACCUMULATORS—New line of accumulators designed to supplement operation of any vane or piston pump in circuits with intermittent high pressure requirement is offered by Vickers Inc. Unusually high safety factor at 3000 psi operating pressures is achieved by unique swedged neck connection and one piece, seamless alloy steel shell construction. The design follows practice recommended by J.I.C. hydraulic standards for industrial equipment.



Accumulators are available in five models with capacities ranging from 75 to 2050 cu. in. Standard accessories, including gage and adapter assembly, precharging and gaging hose assemblies are also available.

Circle 106 on Reader Service Card

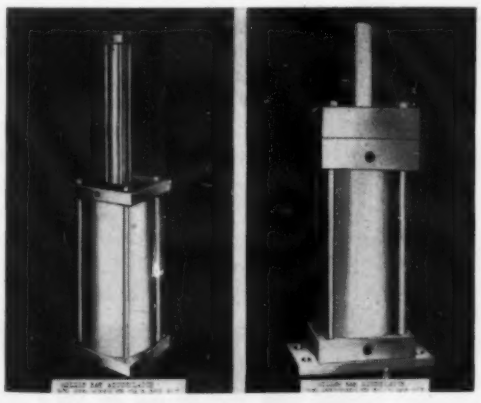
ROTARY ACTUATOR—Lear, Incorporated has introduced a small, light-weight rotary actuator which weighs less than one pound, yet develops a maximum peak output off 110 inch-pounds with a normal rated peak load of 60 inch-pounds. This new actuator provides a non-linear torque output which approximates typical aircraft duct damper and fuel valve load curves, resulting in high "breakaway" and "tight-closing" torques required for valve operation plus high efficiency over its entire cycle.

Specification Model 167-A Rotary Actuator

Maximum peak output torque	110 in.-lbs.
Normal peak output torque	60 in.-lbs.
Size	3" x 2" x 3⅝"
Weight	.96 lbs.
Voltage	26 v d-c
Duty cycle	1 sec on, 5 sec off
Shaft rotation	90 degrees

Circle 107 on Reader Service Card

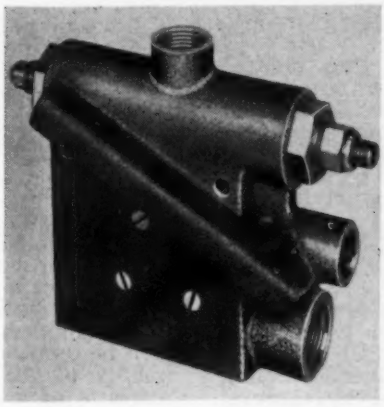
LOW PRESSURE AIR ACCUMULATORS—Low pressure air operated accumulators that eliminate the danger of handling high pressure gases and that store fluids at up to 10,000 psi for use when required are now being offered by Miller Motor Company. Ordinary plant air at 60 to 200 psi is used as the compressible medium. In pump circuits, oil flows from the pump into the accumulator during the non-demand



pump cycle. The oil under the high pump pressure, works against a hydraulic piston driving a larger air piston which, in turn, works against the low pressure compressible air medium. The oil is thus stored at pressures up to 10,000 psi, for either immediate or later discharge, usually at high flow rates of short duration. They are generally used in this capacity on die casting machines, plastic molding presses, heavy machine tools, etc. The sturdy, all metal construction of these accumlators adapt them for applications in which severe shock loads are encountered, particularly when the accumulator must completely unload itself in stopping and reversing the motion of a moving mass. Also, these units can be unloaded and reloaded at will. By merely changing the circuit connections these accumulator units can be employed as "boosters", with either plant oil or air line pressure used as the input medium in developing up to 10,000 psi hydraulic output pressure for operation of hydraulic work cylinders.

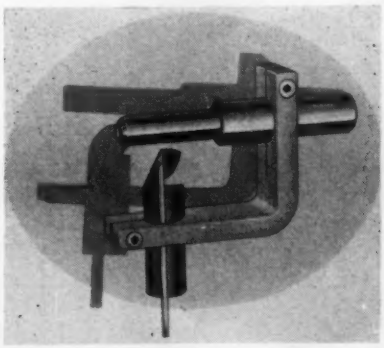
Circle 108 on Reader Service Card

HYDRAULIC-PRESSURE ELECTRIC SWITCH—Designed for instant electric circuit control and overload protection by means of hydraulic-pressure actuation, the new cartridge-type switch introduced by Pantex Manufacturing Corporation, will cut-in and cut-out electric circuits with as little as 12 to 18 per cent pressure differential. Unaffected by extreme pressure surges, temporary or sustained, the unit has also withstood a wide temperature differential ranging from -65 F to +160 F without loss of accuracy or other desirable operational characteristics. The design of this unit eliminates failure due to either mechanical or hydraulic shock. It operates immediately with every start of the pump and requires no pressure build-up. Small, light-weight, and silent, the hydraulic pressure electric switch is quickly and easily adjusted, without breaking the line, with the added feature of pre-set switch limitation if desired.



Circle 109 on Reader Service Card

HOSE COVER STRIPPING TOOL—For removing the outer cover from double and single wire braid hose, before attaching the fittings, Aeroquip Corporation offers a hose cover stripping tool. The tool is an inexpensive product which may be used with equal efficiency by placing it in a standard shop vise, lathe chuck, drill press or in the revolving chuck of the Aeroquip hose line assembly machine. Compact and manufactured of quality materials, each part of the tool is individually replaceable. Each mandrel is designed to insure the user automatically removing only the amount of cover necessary for assembling the corresponding hose fittings.

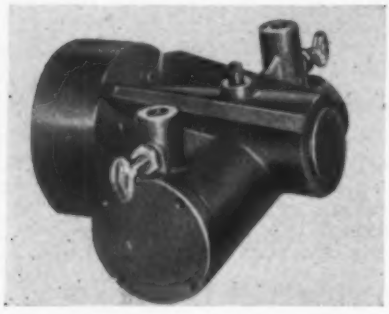


Circle 110 on Reader Service Card

HYDRAULIC FLUID—A non-flammable type hydraulic fluid has been developed by Monsanto Chemical Company for general industrial use. The fluid designed as F-9 has been received with considerable interest throughout the die casting industry. F-9 has demonstrated outstanding fire resistance along with excellent lubricity, hydrolytic stability, oxidation resistance, and pumpability.

Circle 141 on Reader Service Card

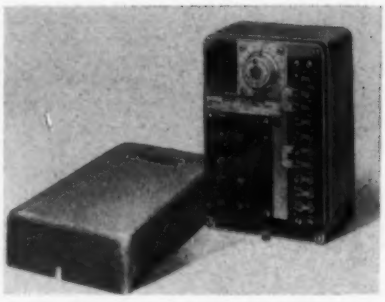
AIR MOTOR—Airlock motors designed by Q-C Engineering Products convert compressed air through gearing to high torque reciprocating rotary motion of the driven shaft for operating jigs and



fixtures. The unit offers control of torque and speed in both directions and incorporates a lock which positively stops all movement in either direction should the air pressure drop or fail. Base and flush mounting styles are available.

Circle 111 on Reader Service Card

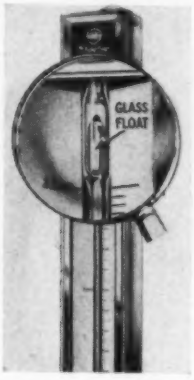
ELECTRIC TIMER—A new, compact electronic timer which provides automatic control of operation, limit, and sequence timing has been announced by General Electric's Control Divisions. The timer is designed to fulfill indus-



trial requirements for flexibility of application, accuracy and reliability in operation, low maintenance, and simplicity and servicing. It is available in three time ranges: .06-1.2 seconds, .6-12 seconds, and 6-120 seconds, Life tests indicate that the new timer can perform a million or more operations at these controlled load requirements: inrush—15 amps, carry—10 amps, and break —5 amps.

Circle 112 on Reader Service Card

OVERFLOW CHECK VALVE—An all-glass overflow check valve to prevent loss of indicating gage or manometer liquid due to surge pressure is announced by King Engineering Corp. This unit can be used on hydrostatic instruments of all kinds. The valve consists of a glass float check in a glass cylinder. The cylinder has a seat at the top opening, and a glass tube below for connecting to the instrument. The mating surfaces of the float and cylinder are ground and lapped to a perfect fit, and are so designed that the indicating liquid in the instrument will wet the seat and form

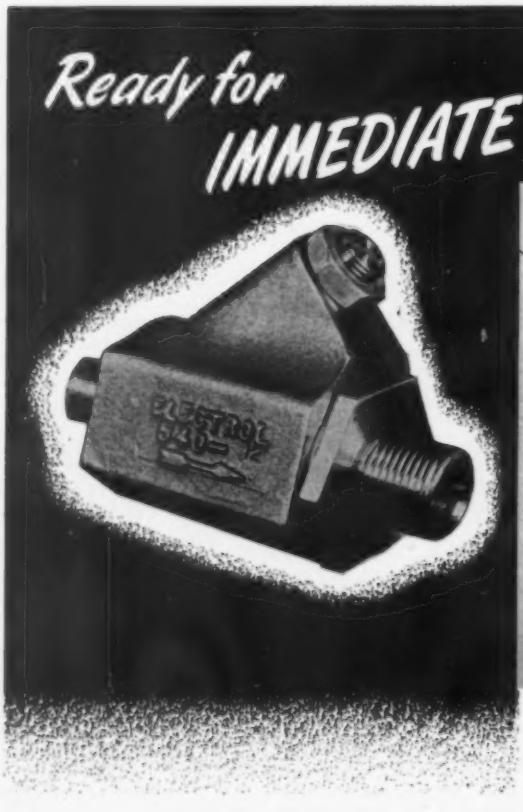


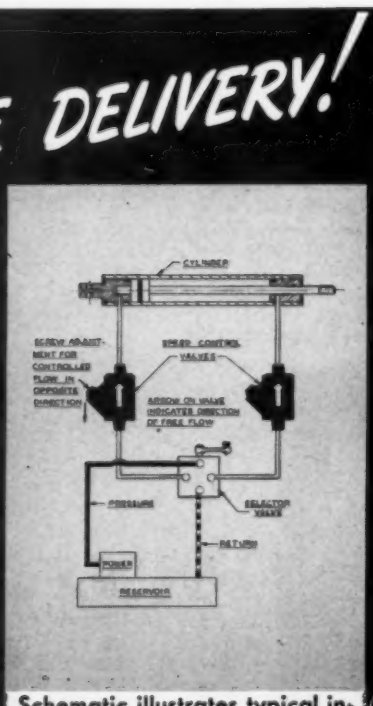
a liquid seal. When excessive or surge pressures occur, the float rises instantly to form a perfect seal.

Circle 113 on Reader Service Card

AIR VIBRATOR—The Cleveland Vibrator Company has simplified the design of its type "F" unit, reducing the number of major parts to five components in contrast to other types of vibrator units having as many as 50 parts. This simplified design has distinct advantages: maintenance is re-

Ready for IMMEDIATE DELIVERY!





Schematic illustrates typical installation of Electrol Speed Control Valves.

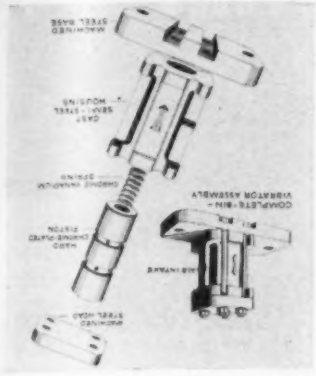
Electrol
SPEED CONTROL VALVES
for ⅛, ¼, ⅜, ½ and ¾" N. P. T.

Electrol Speed Control Valves are designed for use in air or oil, with operating pressures up to 1,500 p.s.i. They allow flow in one direction and, by use of a metering device and check valve, accurately control reverse flow from 0 to valve maximum — even after thousands of cycles. Send us your print so we can work with you in adapting this unit to meet your specific requirement.

Electrol
INCORPORATED
85 GRAND STREET
KINGSTON, NEW YORK
CYLINDERS · SELECTOR VALVES · FOLLOW-UP VALVES · CHECK VALVES · RELIEF VALVES · HAND PUMPS · POWERPAKS · LANDING GEAR OLEOS · SOLENOID VALVES · ON-OFF VALVES · SERVO CYLINDERS · TRANSFER VALVES · CUT-OUT VALVES · SPEED CONTROL VALVES
FOR BETTER HYDRAULIC DEVICES

Better Designed Products Use Electrol Hydraulics

duced to a minimum; wear is virtually eliminated; operation is easier. The component parts—mounting base plate, housing,



spring piston, and head—are assembled with four longitudinal body bolts and special stop lock nuts.

Circle 114 on Reader Service Card

AIR LINE LUBRICATOR — To provide automatic lubrication for tools using 10-60 cfm, Keller Tool Company is announcing a recently developed Air Line Lubricator in two sizes. With the larger size, lubrication of one or more tools is automatically accomplished, where a minimum of 10 cfm is used by one tool and a maximum of 60 cfm by all tools taking air through the lubricator.

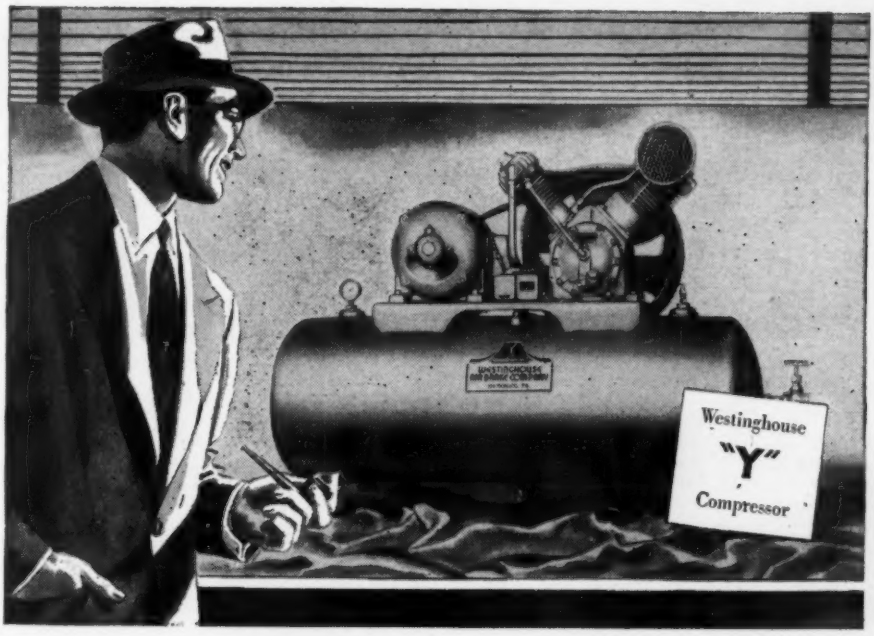
The bowl designed to hold 6 ounces of light oil, provides oil feed through a porous bronze wick. When used with a 35 cfm tool, the bowl holds enough oil for 8 to 10 weeks of lubrication under normal usage.

Circle 115 on Reader Service Card

LINEAR ACTUATOR—A new quick-stop linear actuator for operation of aircraft pilot canopies is announced by Rhodes Lewis Company. The actuator, which

opens and closes a 150 pound canopy, has a special clutch and brake arrangement which permits a stop within 5 degrees rotation of the output shaft. Its 24 volt d-c motor develops 1/10th horsepower at 10,000 rpm.

Circle 116 on Reader Service Card



When shopping for Production Aids—

Here's a Checklist you can follow!

☑ *the Westinghouse "Y" Compressor*

Cut costs, boost efficiency, eliminate complication—Departmentalize your air supply—install a Westinghouse "Y" in each work area. Operate only when required . . . eliminate cost and complexities of pipe network.

Westinghouse "Y's" give you the famous "Engin*aired*" features: 1) Controlled Pressure Lubrication; 2) Low Oil Level Protection; 3) Thermal Overload Protector. Write for Bulletin IDC 9302-3.

☑ **FLEXAIR® VALVES**

Give graduated control for clutches, cylinders, etc. Supplied in different styles for one to four pipe control.

☑ **H-Type CONTROLAIRS®**

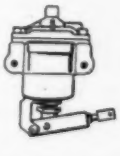
Single and double Valve construction for graduated pressure control. Arranged for pedal, cam or knob operation.

☑ **TRIDYNE®**

A three-position power cylinder.

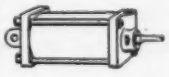
☑ **PILOTAIR® VALVE**

Single and double construction for flow control.



☑ **ACTUATORS**

Power transmitting devices used where precise positioning is required.



☑ **CYLINDERS**

Single or double acting, in 1" to 6" dia., with 2", 4", 6", 8" and 10" stroke.

Westinghouse Air Brake Company's pneumatic control equipment covers the field of industrial needs. All devices designed to withstand hard service, to group readily, mount accessibly. Write for Bulletin IDA 9481-1.

Westinghouse Air Brake Co.

Industrial Products Division—WILMERDING, PA.

DISTRIBUTORS THROUGHOUT THE UNITED STATES . . . CONSULT YOUR CLASSIFIED DIRECTORY

Circle 31 on Reader Service Card

Useful Catalogs and Bulletins

available for reference

"O" Ring Catalog and Manual . . . The Parker Appliance Co. has just issued their Catalog 903, "O" Ring Catalog and Manual. The new catalog, with 40 pages, is the largest "O" ring manual ever issued by this company. A full line of aircraft hydraulic rings, with complete series of AN-6227 and AN-6230 rings, AN-6290 fitting gaskets and AF-934 fuel resistance "O" rings, as well as a full range of standard industrial "O" rings. Also included are a group of special service compounds for diesel, processing and other services. A very useful engineering section, with useful information on "O" applications, makes the manual particularly valuable to the industrial "O" ring user.

Circle 117 on Reader Service Card

Automatic Speed Control . . . Four basic control systems for variable speed drive: pneumatic, hydraulic, electronic and mechanical are described in Link-Belt Catalog 2349. For exacting automatic control requirements the combination of a P.I.V. variable speed drive and a small servo-hydraulic system is offered. Where it is desired to operate with plant or process air and where equipment must be explosion proof, pneumatic control is described.

Circle 118 on Reader Service Card

High Speed Pumps . . . Bulletins describing Electraulic high-speed, high pressure, straight-in-line, multi-ram pumps are available. These self-priming pumps will supply 3 tons per square inch pressure with a volumetric efficiency of 97 per cent at 1500 rpm. Press applications are fully illustrated.

Circle 119 on Reader Service Card

Pressure Switch . . . Type SB sensitive pressure and vacuum switches are described in Bulletin 4926P issued by United Electric Controls Company. For use in applications in which close on-off differentials and consistant maintenance of cut-in and cut-out settings are essential in the control of pressure or vacuum, the switches are available in an adjustable pressure range 0 to 15 psi and vacuum range 30 to 0 in. hg.

Circle 120 on Reader Service Card

Compensator Controlled Pumps . . . Where regulation of delivery volume in a hydraulic system is required, Denison Engineering Co. offers three types of variable volume, compensator controlled pumps. They are rated at 10, 20 and 35 gpm for operating pressures up to 5000 psi. A chart on Bulletin sheet P-4-2 supplies detailed operating characteristics. Stroke change is controlled by the system pressure, when the pump is operating at a pressure less than the compensator setting, the pump delivers full volume. When the compensator pressure setting is reached the volume is automatically reduced to maintain this pressure.

Circle 121 on Reader Service Card

Pneumatic Slide Rule . . . For quick determination of air cylinder piston stroke, diameter, pressure and air volume requirement, Hanna Engineering Works has prepared a handy 3½x10 in. selector slide rule. Conversion factors, friction correction factors and necessary instructions for use are printed on the rule. Horsepower requirement for air compressor to meet your application can be rapidly calculated.

Circle 122 on Reader Service Card

Hydraulic Control Valves . . . Most recent engineering developments on Logansport Machine Company's control valves are presented in Catalog No. 200, Section 4 along with valuable circuit installations. Construction drawings and dimensional data illustrate manually operated, pilot operated with air or oil, and solenoid operated valve. Both 2- and 3-position, 4-way directional valves are available. Rotary pilot, pressure reducing, relief, check, and speed control valves are completely described.

Circle 123 on Reader Service Card

Circuit Components . . . Need circuit component data for hydraulic systems on winches, loaders, truck units, plows and earth-moving equipment? Catalog H-2 prepared by The Commercial Shearing and Stamping Company describes their line of gear pumps, control valves and cylinders in many of these applications; fluid pumps and motors, single type, in 1 to 20 hp ratings and tandem type in 16 to 46 hp are built. Valve pump combinations—units for dump body operation are standard products. Six mounting styles and three end fitting styles of cylinders are illustrated.

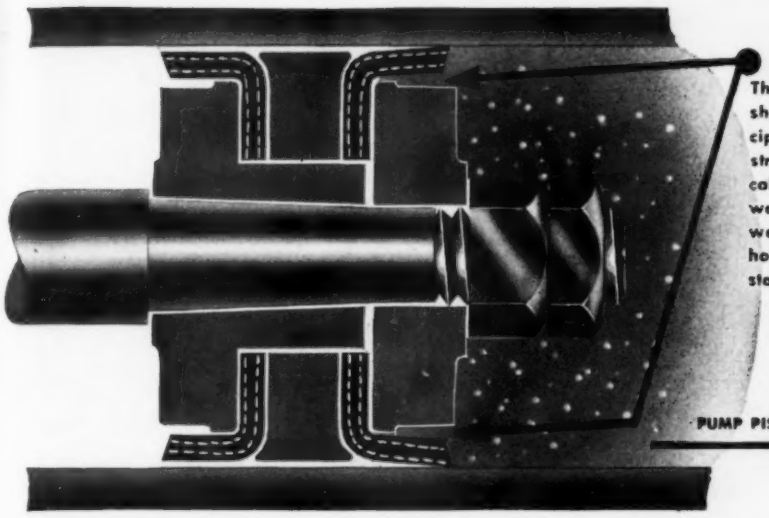
Circle 124 on Reader Service Card

Porous Stainless Steel Filters . . . Using easy-to-read diagrams, tables and categorized data illustrated throughout, the Micro Metallic Corp., manufacturers of Surfamax filters, has prepared an informative 8-page booklet on the advantages, uses operation and manufacturing methods of SMX filters. A listing is given on the properties, water flow and air flow of these porous stainless steel filters, providing maximum filter surface in minimum volume. Types of filters and their arrangements for various requirements is covered, together with detailed engineering information on dimensions and specifications. Also dealt with are the advantages of Surfamax filters for large operations and the type of applications in which Gravitan filters are used. A valuable outline on how to select SMX and GTN filters is also included.

Circle 125 on Reader Service Card

Hydraulic Oils . . . Houghton's hydraulic oils 150, 225, and 275 are described in a new 4 page folder. Recommendations on "where and when to use" are listed.

Circle 126 on Reader Service Card



This greatly exaggerated diagram shows the Darcova Pumcup principle. On pressure side of each piston stroke, flexible Pumcup is automatically forced against liner or cylinder wall. Firm, uniform contact all the way around eliminates slippage, holds volumetric efficiency at constant high in spite of gradual wear.

PUMP PISTON MOTION

THEY NEVER RELAX
when the pressure is on!

HERE is a piston packing that actually takes *advantage* of the fluid pressure built up in reciprocating pumps and in air or hydraulic mechanisms. The illustration above shows how Darcova Pumcups utilize this pressure . . . how they hug the cylinder wall on every work-stroke of the piston, preventing needless slippage.

Then, too, friction between the Pumcup and cylinder is automatically "pressure-equalized" all the way around for a uniformity of wear otherwise impossible. And, in contrast to other types of packing, fluid slippage does not increase with wear. Peak volumetric efficiency is retained even when Pumcup wear is far advanced.

Consequently, Pumcups offer two mighty important advantages. First, downtime and material and maintenance costs are cut to a fraction because Pumcups outlast other types of packing many times over. Secondly, volumetric efficiency is held constant.

Everything considered, it is easy to see how thousands of Darcova Pumcup users are saving up to $100 per pump per year. Easily installed, Pumcups replace ordinary packing in reciprocating pumps and in air or hydraulic mechanisms. They are precision built in ½ to 42 inch sizes and in many different textures for practically all fluids, pressures and temperatures.

DARCOVA
THE ORIGINAL COMPOSITION CUP

***FREE BULLETIN**—For a free bulletin containing complete information, write, or use the coupon below.*

DARLING VALVE & Manufacturing Co.
WILLIAMSPORT, PA.

Darling Valve & Mfg. Co., Williamsport 15, Pa.
Please send me the free bulletin checked below:
☐ No. 4401 Darcova Pumcups for reciprocating pumps.
☐ No. 4502 Darcova Pumcups for air or hydraulic mechanisms.

Name_____
Company_____
Address_____
City_____ State_____

J.I.C. Symbols . . . For quick reference, Western Control Equipment Company offers a notebook sheet of JIC Hydraulic Symbols. All basic symbols with examples of combinations are included on this durable, easy-to-read form.

Circle 127 on Reader Service Card

Air Power . . . If your air power requirements include cylinders, impact hammers, air presses, drill press feeds or collets, Mead "Industrial Air Power Catalog-1950" will supply you with 51 pages of application and equipment data. Fully illustrated with "on the job" equipment, the booklet includes complete installation data of Mead air operated devices.

Circle 128 on Reader Service Card

Pressure Reducing Valve . . . Hydraulic Equipment Company offers Bulletin VA100 describing the operation and construction of their VA series valves. Used to reduce line pressure in oil systems so that individual units may be operated without changing normal system pressure, the valves work at a maximum inlet pressure of 1000 psi and will provide a reduced pressure range from 100 to 1000 psi.

Circle 129 on Reader Service Card

Hydraulic Oils . . . Offering a type and viscosity for every application, 8 page folder "Sun Hydraulic Oils" is a complete, handy reference guide. A chart illustrates the life characteristics if Circo, Solnus, Sunvis and Lubway oils under given operating temperatures. Typical case histories of actual applications will assist you in selecting the proper oil.

Circle 130 on Reader Service Card

Thermal Switch . . . Applications of electrical circuit control with temperature variation can be met with the "Temp-Cop" thermal switch described in Data Sheet 56 issued by Micro Switch. The switch can be calibrated to operate at temperatures between 0 and 300 F. Temperature differentials can range from 10 to 40 F. The movement of bimetallic elements caused by temperature changes provides operating force. Samples will be furnished for experiment.

Circle 131 on Reader Service Card

Fittings . . . No flaring, threading, welding or soldering is necessary when using Ermeto fittings. The Weatherhead Company offers Catalog E-1457 showing how the fittings function and presenting complete fitting data. Made in steel and stainless steel the fittings are available in a large variety of sizes and body styles. Of particular value to design engineers and draftsman are the pages on recommended tube fitting practice.

Circle 132 on Reader Service Card

Pendulum Action Pump . . . American Engineering Company, in a 4 page folder, illustrates the pendulum action principle of their new hydraulic pump. Delivering up to 5000 psi. Hydramite fluid power is a radial piston, constant displacement, oil-operated pressure generator. Pendulum action distributes thrust of plunger and reduces unit stresses. This pump is available in three sizes 3, 5, and 10 gallons per minute, operating at 1150 rpm and using an oil of 150 to 300 SSU viscosity at 100 F. Performance curves are included in this bulletin.

Circle 133 on Reader Service Card

* Fluid Power Improves Production

"LOGAN" AIR-DRAULIC® FEED-CONTROLLED CYLINDERS

• Power Movements in Any Direction
• No Power Unit Required

Combines

the fast-acting, economical, low pressure operation of AIR

with the smooth, uniform controlled regulation of OIL

5 STANDARD MOUNTING TYPES

Foot • Center Line • Blind End Flange • Rod End Flange • Clevis

Standard bores from 3" to 8" Any stroke to 5' For air pressures to 150 p.s.i.

*ENGINEERING SERVICE: Consult our engineers regarding type of cylinders best suited to your needs. No obligation.

Logan Air-Draulic Cylinders provide far more accurate, uniform action than any ordinary air cylinder. They can be furnished for controlled feed with rapid return in either direction, or with controlled feed in both directions. Skip feed movements can also be provided by means of a cam valve in the hydraulic circuit.

FREE CATALOG Write for your free copy of catalog No. 471. Contains full engineering data and diagrams.

Logan SAVES * TIME * EFFORT * MOTION

Air and Hydraulic Equipment

LOGANSPORT MACHINE CO., INC. 832 Center Ave. Logansport, Ind.

BROOKS • CYLINDERS • VALVES • PRESSES • SURE-FLOW COOLANT PUMPS

FLUID POWER SPECIALISTS SINCE 1916

. . . ask yourself these questions—

1. **Why should we use "fortified" hydraulic oils?**
2. **What oil supplier is the pioneer in such oils?**
3. **What brand is approved by most makers of hydraulic mechanisms?**
4. **What one company supplies both hydraulic oils and hydraulic packings?**
5. **Why should I buy both oils and packings from one source?**

1. For longer, trouble-free service, modern hydraulic oils are being fortified scientifically to (a) increase their resistance to oxidation, (b) hold gums in solution until the oil-change period, (c) prevent corrosion of metal parts, and (d) increase the film strength of the oil.

   Results: better indexing, freedom from chatter, cleaner machines, longer oil life.
2. E. F. Houghton & Co. led the oil industry in its pioneering development of treated hydraulic oils.
3. HYDRO-DRIVE Hydraulic Oils are on the approved list of practically all manufacturers of hydraulic mechanisms.
4. Houghton is the only manufacturer of both hydraulic oils and hydraulic packings—leather and synthetic rubber.
5. Houghton makes sure that its hydraulic oils and packings are compatible, that the oil does not adversely affect the packings, and that the packings form perfect oil seals.

Those are good reasons why you should specify "Houghton" for hydraulic design or maintenance. For complete data, call or write E. F. Houghton & Co., 303 W. Lehigh Avenue, Philadelphia 33, Pa. Service and sales in all principal cities.

HOUGHTON'S

HYDRO-DRIVE HYDRAULIC OILS

OTHER HOUGHTON PRODUCTS include industrial lubricants, cutting oils, cleaners, heat treating materials, rust preventives.

Circle 34 on Reader Service Card

Lubricating Systems . . . If it's centralized lubrication you're after, Bulletins 484 and E 463 issued by Trabon Engineering Corporation will supply you with data. Positive centralized lubrication providing a measured amount of lubricant to every bearing during a lubricating cycle is discussed. Engineering specs on the grease systems are complete.

Circle 134 on Reader Service Card

Instrument Oils . . . Two new "synthetically tailored" lubricants recommended for use in fine precision instruments are being introduced by Gulf Oil corporation. These oils have a non-spreading quality which enables them to "stay put" over long periods of time. They are highly resistant to oxidation and exceptionally low in volatility.

Circle 135 on Reader Service Card

Centrifugal Pumps . . . Cross-sectional drawings and rating curves are presented in Worthington's 19 page Bulletin W-306-B1 to assist in the selection of Monobloc single and two stage centrifugal pumps. Examples are worked out for the selection of cold water pumps.

Circle 136 on Reader Service Card

Heat Exchanger . . . If you want to determine the proper size of a fixed bundle heat exchanger for your circuit, Young Radiator Company's Catalog 1049 will assist you. A typical installation is worked out. Specifications for double pass and single pass coolers are charted to aid you.

Circle 137 on Reader Service Card

Reset Counter . . . For processing machines which require errorless control and must function with pin point accuracy, Bulletin 720 offers the Eagle Microflex counter. The counter in response to impulses received from an external source can be preset to close or open a circuit anywhere within its counting range from 1 to 400 impulses. Line diagrams show the sequence of operation of this couunter which will reset, after its counting range, in less than one sec.

Circle 138 on Reader Service Card

Tube Fittings . . . New, improved Flodar Standard J.I.C. hydraulic tube fittings are offered in catalog 500. You can get useful reference data on engineering specifications and recommendations for tubing and wall thickness to hold desired working pressures. Design features of these fittings include alloy steel spring sleeve, which holds tube securely with increased holding power; cantiliver spring fingers which grip the barrel at the tube like a collet; short radius swing which permits close mounting to tee and elbow fittings.

Circle 139 on Reader Service Card

Air Compressor . . . Ingersoll-Rand offers a new Bulletin describing their "Y" series stationary air compressors. The "Y" series consists of two lines, one designed for normal industrial pressures of 100-125 pounds; the other rated at 200 pounds for continuous service, and up to 250 pounds on intermittent pump-up service. Both lines are available as tank-mounted, baseplate-mounted or bare units, with electric-motor or gasoline-engine drive. The units are air cooled by means of fan blades integrally cast on the fly wheel.

Circle 140 on Reader Service Card

"CHOOSE THE AIR VALVE YOU HELPED DESIGN

FOR AIR CYLINDER CONTROL
FULL FLOW • COMPACT • ONE MOVING PART
PRECISION SPOOL AND BORE THAT IS
HARD CHROME PLATED FOR EXTRA LIFE
BALANCED TYPE "AIR PRESSURE SEALED"

TWO BASIC
PIPE SIZES
3/8" - 3/4"

MAC
MECHANICAL AIR CONTROLS, INC.
5427 HECLA AVENUE
DETROIT 8, MICHIGAN

CAM VALVE

PILOT CONTROLLED VALVE

FOOT VALVE

DOUBLE SOLENOID VALVE

SOLENOID VALVE

TWO PRESSURE VALVE

Write for Catalogue

Scraper Engineer

(Concluded from page 35)

that are now using some form of hydraulic transmission?

Adams: To my knowledge there are several "cat" type crawler tractors using the hydraulic transmission, but we are pioneering its use in the rubber tired high speed tractors. The hydraulic power convertors and transmissions allow for the complete synchronization of the two front and rear scraper power plants; allow for the increased build up of the engine power required for the necessary slow scraper loading speeds and allow for the fast, easy shock-absorbing and synchronized gear shifts of the twin engine power plants.

AH: As an engineer you are sold on oil power.

Adams: Yes, and so is the user, for he is finding that the oil system costs less for field maintenance per cubic yard of earth moved, and even more important there will be less costly down-time on the job.

The development of land leveling scrapers has a colorful history which parallels the demands made by western construction. Bill Adams briefly tells us of these "early days".

Adams: Probably the first land leveling scraper was the Mormon buck-board scraper built by the early Mormon settlers in Utah, because of the extreme necessity of having an economical method of digging canals and ditches to bring the mountain snow water to their desert farms.

About 1870 when more extensive land leveling and canal building for land irrigation was undertaken in the San Joaquin Valley, the "Fresno" drag scraper was born. This horse, or mule drawn scraper was a more useful adaption of the Mormon buck-board idea, in that it was built to contain more earth and could more easily slide the earth load from the "cut" to the "fill".

The next important change came in the early 1920's when both track type and farm wheel tractors started to replace the horses and mules. In the middle and late 1920's, the larger track type tractors were becoming dependable and economically practical. During this time, I designed, developed and pioneered the curved ball earth carrying, automatic closing, front apron now used on every carry scraper built today. With this front apron the whole scraper load is carried instead of part carry and part drag. From this development and the introduction of hydraulic power, came the modern scraper capable of carrying 15 to 25 cubic yard loads at 15 to 35 miles per hour.

AVICA
HYDRAULIC
HOSE ASSEMBLIES

FROM 5/32" I.D. TO 2" I.D.

PATENTS PENDING

AVICA Flexible Pipes are economical as they are furnished as complete assemblies. They can be supplied with either fixed male pipe thread ends or with AVICA Integral Angle Couplings.

AVICA Hose assemblies: —

- **SAVE SPACE**
- **SAVE ENGINEERING TIME**
- **SAVE ASSEMBLY TIME**
- **REDUCE MAINTENANCE COSTS**

and give your product a tailored appearance. AVICA Flexible Pipes are giving satisfactory service in Hydraulic Applications at working pressures to 3000 pounds P.S.I. There is an AVICA Hose Assembly to fit every Hydraulic operation.

Send us your blueprints or sketches and our Engineering Department will design a Hose Assembly to fit your particular requirements.

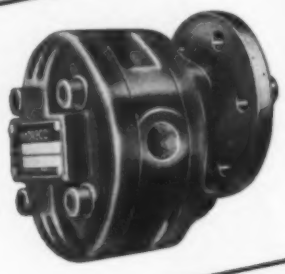
AVICA CORPORATION
PORTSMOUTH, NEWPORT, RHODE ISLAND

IN EUROPE
AVICA EQUIPMENT, Ltd. TRADE MARK
50 PALL MALL
LONDON, S.W.1, ENGLAND

Circle 36 on Reader Service Card

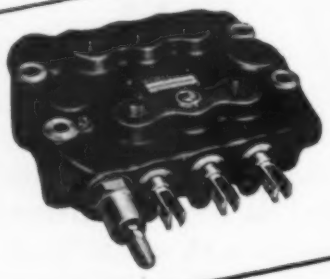
OIL-HYDRAULIC PUMPS • VALVES • CYLINDERS

Look to HYDRECO *for* ALL THREE!



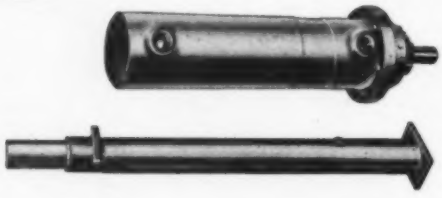
Four-Bolt pumps

HYDRECO gear type pumps are made in five basic sizes with a variety of flange or base mounted types, ½ GPM to 130 GPM, and for operating pressures up to 1500 p.s.i.



control valves

HYDRECO control valves are made in a variety of sizes and plunger arrangements, in capacities from ½ GPM to 150 GPM, and for operating pressures up to 1500 p.s.i.



cylinder assemblies

HYDRECO cylinders are made in single-acting, double-acting and telescopic designs in sizes up to 8″ effective diameter. Plain, eye-type, or ends of special design are available for all sizes.

NOW, MORE THAN EVER BEFORE!

LOOK TO HYDRECO FOR ALL THREE *for* – PERFORMANCE – QUALITY – DESIGN

Send for Bulletin 101 showing complete line of gear pumps, control valves, auxiliary valves, cylinder assemblies and combination pump-valve-tank units.

Write to

HYDRAULIC EQUIPMENT COMPANY
1104 EAST 222ND STREET • CLEVELAND 17, OHIO

HYDRECO
HYDRAULIC CONTROL DEVICES
PUMPS · CYLINDERS · VALVES

THE MARK OF QUALITY

Mechanized Maintenance

(Concluded from page 43)

(2) Functional Testing of components after overhaul. This testing is performed on stationary shop type machines.

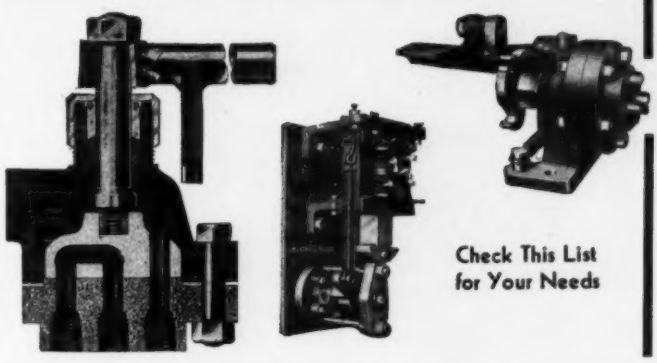
Each subsystem of the complete hydraulic system is functional tested at regular intervals by means of portable hydraulic test machines. To test the operation of the hydraulic system, the "gig" is towed to the aircraft and connected to special pressure and return ports in the aircraft hydraulic system. The "gig" is then started and the system is tested in accordance with specifications and procedures given by the aircraft manufacturer.

At scheduled engine change or plane overhaul, the entire hydraulic system is disassembled and all the components are removed from the airplane and sent to the shop for complete overhaul. All parts are individually inspected for size, wear and clearance with mating parts.

Aviation, in spite of its tremendous growth during the past decade, is still in its adolescent stage. As the nature and expansion of the industry creates new testing and maintenance problems, equipment for efficiently meeting and solving such problems will keep pace.

*Sales Manager Greer Hydraulics Inc.

Circle 39 on Reader Service Card



Check This List for Your Needs

NICHOLSON AIR AND HYDRAULIC VALVES

Are in Use for Controlling These Types of Equipment:

Plastic Molding Presses
Sterilizers
Presses - Hoists
Cranes - Elevators
Gates - Dumps
Brakes - Clutches
Bus Doors
Locomotives
Larry Cars
Road Machinery
Large Gate Valves
Banbury Mixers
Watch Case Heaters
Vulcanizing Machines
Rimming Machines
Saw Cut-Offs
Open Hearth Furnaces
Mud Guns
Bell Valves
Molding Machines
Die Machines
Ore Tables
Automobile Lifts
Special Applications

Nicholson standard and special valves in lever, foot, solenoid, motor types; for air, gas, oil, steam, water ¼" to 2½"; press. to 5,000 lbs. CATALOG 546.

W. H. NICHOLSON & CO. 213 OREGON ST. WILKES-BARRE, PA.

TRAPS • CONTROL VALVES • STEAM SPECIALTIES

"Parco" is a trade name to rely on for better "O" rings. Better because the material used is precision compounded and fabricated by men with years of experience. All dash numbers of 6227, 6230 and 6290 series for commercial applications or Army-Navy installations to Specifications MIL-P-5516 (6227 and 6230) and MIL-P-5510 (6290) are available from stock. Silastics, Kel-F, and other special compounds are available on order.

Catalog and engineering data on request. Write us today.

Parco

Plastic and Rubber Products Company
2100 Hyde Park Blvd., Los Angeles 47, Calif.
919 No. Michigan Ave., Chicago, Ill.

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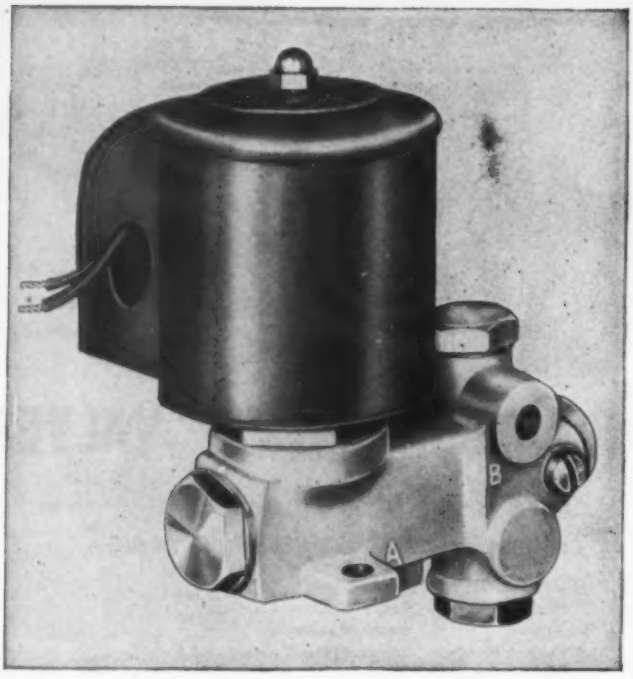


3-Way Solenoid Valves

. . . ideal for pilot control

Do any of the machines you are designing require a control for automatically applying and releasing pressure from some pressure actuated device or part? We have in mind such machines as:

- AIR OR GAS COMPRESSORS
- CAN MAKING MACHINERY
- TIRE BUILDING MACHINERY
- DOOR OPENERS
- DIAPHRAGM PUMPS
- POWER PRESSES

A simple and dependable device for this purpose is the ASCO 3-way Solenoid Valve! Its function is to open and close ports as required by electrical impulses from a timing device. Many varieties are available; also sizes, the larger units being the packless pilot controlled type in contrast with the smaller direct operated solenoid valves. Many units also are available with explosion-proof and water-proof solenoids.

Tell us about your control requirements. We'll be glad to recommend the type we feel best for your purposes. Be sure to give complete details as to nature of gas or liquid handled; temperature, viscosity, volume, etc.

ASCO Solenoid VALVES

When in need of Automatic Transfer Switches, Remote Control Switches, Contactors, Relays, and Specialized Electromagnetic Controls, come to us.

Automatic Switch Co.

385-H LAKESIDE AVENUE · ORANGE, NEW JERSEY

Circle 37 on Reader Service Card

3000 Rings an Hour!

(Concluded from page 41)

an accumulator is very logical in that it permits a small pump operating continuously to store the oil needed for a cutting operation. During the actual cutting operation, the speed of cut is determined by the pipe connections between the accumulator and cylinder. The cutting cycle is not governed by the pump displacement.

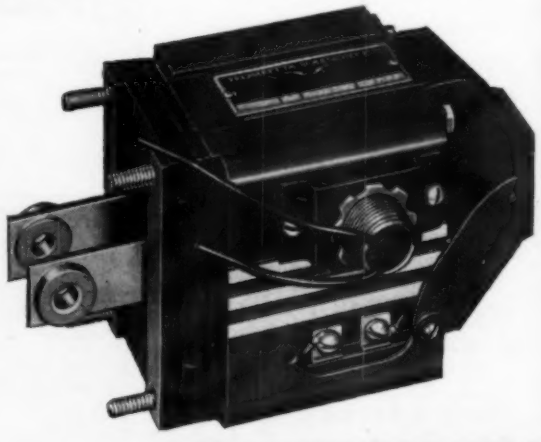
Return oil passes through a single-pass, tube and bundle cooler to maintain the working temperature of the oil at 120-140 F.

Another design feature in this circuit makes use of bumpers built into the end of air cylinder (2). Using a bumper in the air shifting mechanism absorbs the impact caused by high speed shifting and prevents the transmission of this shock to the hydraulic valve (4).

The use of a small piston pump in the system provides maximum efficiency while keeping horsepower at a minimum. System pressure is 900 psi.

This machine designed to take raw stock at one point and drop finished parts into a hopper at another point, meets the high level of production required in the automotive industry. The operations between loading and unloading are automatic and rapid and performed on equipment which will operate continuously with only routine maintenance requirements.

SOLENOIDS FOR HYDRAULIC VALVES . . . . .



G-611-X SOLENOIDS

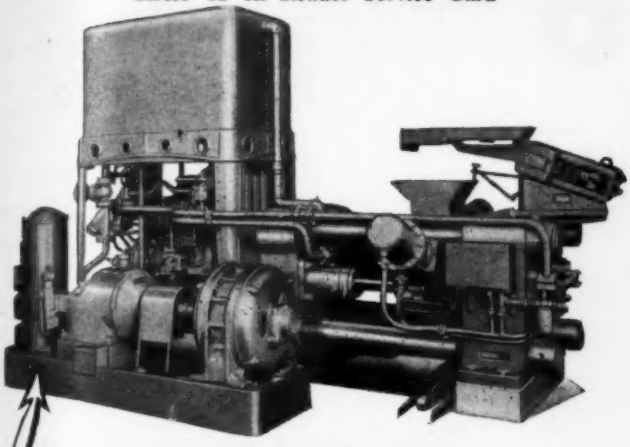
- Trombetta G-600 solenoids are specially designed to meet severe operating conditions
- Make your selection from our complete line of standard or special solenoids
- Solenoid brakes of all sizes are also available

TROMBETTA SOLENOID CO.

331 N. Milwaukee Street • Milwaukee 2, Wisconsin

Circle 38 on Reader Service Card

Circle 41 on Reader Service Card



MILWAUKEE FOUNDRY Specifies Honan-Crane for Hydraulic Oils

On the hydraulic briquetting presses produced by Milwaukee Foundry Equipment Company, Honan-Crane oil purifiers are specified for continuous purification of hydraulic oils.

Complete and satisfactory protection of pumps and precision parts of hydraulic system is assured by continuous purification. Press maintenance and down time due to dirty oil is eliminated.

For full information on low cost purification and maintenance of hydraulic oils, write to Honan-Crane Corp., 102 Wabash Ave., Lebanon, Indiana, subsidiary of Houdaille-Hershey Corporation.

Circle 42 on Reader Service Card

PEMACO HYDRAULIC AND AIR CYLINDERS

Designed to J.I.C. Hydraulic Standards

PEMACO HYDRAULIC CYLINDER

The reputation enjoyed by PEMACO for building first quality hydraulic and air cylinders was not acquired by chance. Sound engineering, modern design, the finest materials combined with years of experienced craftsmanship, has resulted in recognized acclaim throughout industry

Check these 11 points of superiority of the PEMACO HYDRAULIC CYLINDER:

- **"Heavy duty" hi-tensile cast iron castings (steel castings optional).**
- **Ample bronze bearing—oriented behind packing to reduce surge pressure.**
- **New type, low friction ram seal.**
- **"Seal guard" ram scraper gives positive packing protection.**
- **50 Rockwell — hardened and grounded steel ram — score resistant.**
- **Automotive type piston rings.**
- **"O" ring seals.**
- **Internal snap type keeper ring.**
- **Piston and ram positively secured by patented lock nut.**
- **Precision honed steel tubing.**
- **Designed to J.I.C. Hydraulic Standards.**

PETCH MANUFACTURING COMPANY

Write for complete information and engineering data.

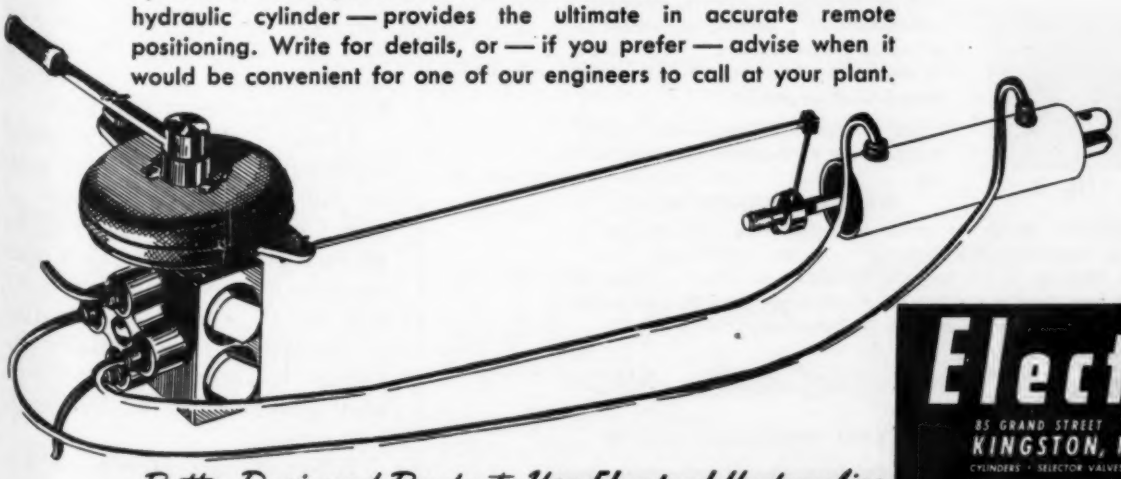
2769-71 HARPER ST.
MT. CLEMENS, MICH.

Provide the MISSING LINK for Remote Controls with

Electrol

FOLLOW-UP SELECTOR VALVES

Solved, at last, is the problem of providing *the missing link* for remote controls. The Electrol Follow-Up Selector Valve, actuated by a fingertip control handle, located at a central station — and used with a hydraulic cylinder — provides the ultimate in accurate remote positioning. Write for details, or — if you prefer — advise when it would be convenient for one of our engineers to call at your plant.



Better Designed Products Use Electrol Hydraulics

Electrol

85 GRAND STREET INCORPORATED
KINGSTON, NEW YORK

CYLINDERS • SELECTOR VALVES • FOLLOW-UP VALVES
CHECK VALVES • RELIEF VALVES • HAND PUMPS
POWERPAKS • LANDING GEAR OLEOS • SOLENOID
VALVES • ON-OFF VALVES • SERVO CYLINDERS • TRANSFER
VALVES • CUT-OUT VALVES • SPEED CONTROL VALVES

FOR BETTER HYDRAULIC DEVICES

PALMETTO®

patterns a ring on a square

for sturdier
vee-packing performance

In designing Pyramid® Packing, Palmetto Packing Specialists **patterned each ring on a square**—to gain the balance of a uniform cross section (each ring sits squat and true . . . there's no chance of cocking or rolling)—to gain the strength of heavier and uniform wall construction (each ring is rugged at the hinge—there's no chance of damage through splitting).

Another plus in Palmetto's balanced design: Two-thirds of the lateral packing surface is sealing surface—which means fewer rings per stuffing box.

And this is just a part of the job accomplished by Palmetto Packing Specialists for improved and prolonged vee-packing performance.

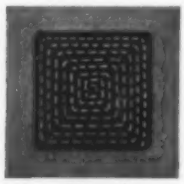


Fig. 1

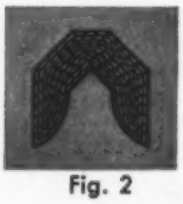


Fig. 2

Because most vee-type packings are laminated, wearing surfaces tend to fray and cause leakage. No chance of that here, for the fabric is folded endlessly into a square (Fig. 1), then molded (Fig. 2), leaving no raw edges to wear, break down and impair efficiency.

The Pyramid is a step and a half ahead of all vee-type packings in design and performance . . . insures automatic, self-compensating packing adjustment to all variations in pressure . . . performs in any stuffing box regardless of motion of rod, shaft or plunger

For the complete facts—the 7-point Design story on Palmetto Pyramid Packing . . .

WRITE FOR BULLETIN MP-20

Palmetto's design of *complete* vee-packing performance is typical. Investigate the "Pyramid" . . . the "G-T Ring®" . . . other packings in the complete Palmetto line. When you have a tough one, think of the Palmetto Packing specialist. He'll have the answer—and it will always be Palmetto-Perfect.

PALMETTO Packings *Specified since 1880*

"WHEN PACKING PERFORMANCE COUNTS"

GREENE, TWEED & CO.
NORTH WALES, PENNSYLVANIA

Training in Your Field

The number and scope of practical training programs on hydraulics and pneumatics is steadily increasing

Allied Institute of Technology. "The Use and Design of Hydraulic and Pneumatic Circuits for Machines and Tools". This course, just announced as "the first of its kind to be offered" will cover applications of hydraulics and pneumatics in controlling and powering mechanisms, analysis and comparison of various components and systems in use and the development of logical and practical design procedures for setting up systems and for purchasing hydraulic and pneumatic equipment. It will be aimed to upgrade designers and engineers in this field. Details of schedules are not yet available but it is reported that the course will be on the clinic basis with the assistance of lecturers and material supplied by various manufacturers.

Caterpillar Tractor Co. A hydraulic training program, an integral part of a 4 year machinist apprentice course, provides for 64 hours of classroom work to include basic physics and hydraulics, pumps, valves, combination units (systems) and special circuits in turn.

Fenn College. "Industrial Hydraulics", offered last year by the Technical Institute of this Cleveland school, will be given again this fall. Two hour sessions one evening each week run for 16 weeks. Registration is limited to men actually engaged in design, installation and maintenance of hydraulic equipment.

International Harvester Co. "Course for Dealer Service Station Foremen, Farmall Touch Control". This is a prac-

Circle 44 on Reader Service Card

tical training program for servicing Farmall Touch Control units, in which students take an active interest in the training.

Rochester Institute of Technology. The Evening and Extension Division offers a course in 'Industrial Oil Hydraulics" two evenings each week for 15 weeks. Designed for maintenance and service men, designers and draftsmen, the course, offered for the first time this spring, will be repeated this fall.

Training Courses in Instrumentation. A number of instrument manufacturers conduct regular training schools to acquaint their customer's instrument men with the theory, construction and operation of their various instruments. Most of these training programs are essentially preventive maintenance courses although some clinics and special programs are given in some cases. Companies that carry out training programs are: Bailey Meter Co., Cleveland, Ohio; Bristol Company, Waterbury, Conn.; Brown Company, Philadelphia, Pa.; Fischer & Porter Company, Hatboro, Pa.; Foxboro Company, Foxboro, Mass.; Leeds & Northrup Company, Philadelphia, Pa.; Republic Flow Meters Company, Chicago, Ill.; and Taylor Instrument Company, Rochester, N. Y.

Vickers, Inc. "Practical Intensive Course in Fundamentals of Operation and Maintenance of Hydraulic Equipment." This two weeks course with 78 hours of instruction and practical shop work, emphasizes the fundamentals of hydraulic operation and the use of orderly methods and logical thinking in service work. Admission by invitation only. Dates of fall courses are September 18-30; October 16-28; November 13-26 and December 4-9.

For additional information, contact the Product Service Department of Vickers, Inc., 1400 Oakman Blvd., Detroit 32, Mich.

From the nation's largest exclusive manufacturer of fittings

a NEW all-purpose Flareless Fitting

as simple as A B C

IMPROVED DESIGN of the AFCO flareless fitting eliminates tube gouging and limits tube distortion — permits quick economical installation without special tools, requires no tube flaring, and is ideally adaptable to close quarter connections.

LEAK-PROOF — PRESSURE-PROOF — the gripping action of the fitting sleeve forms a positive leak-proof seal and makes the fitting especially suitable for thin wall tubing of brass, copper, steel, stainless steel, or aluminum alloy.

PRECISION MADE — AFCO fittings are available in all popular shapes for tube sizes up to and including 1 inch. Special sizes and shapes for tubing up to two inches O.D. can be furnished. All "AFCO" fitting shapes (elbows, tees, etc.) are machined from forgings — all other parts are machined from bar stock.

MEETS ALL SPECIFICATIONS — The AFCO flareless tube fitting meets all requirements of the J. I. C. Hydraulic Standards for industrial equipment and Specification AN-F-47. Because of close tube fit, the AFCO Flareless Fitting is particularly desirable in connection with food processing where sanitation and cleanliness are so vital.

SPECIALISTS IN FLARELESS • FLARED • PIPE • AND HOSE FITTINGS

AFCO *Fittings*

The Aircraft Fitting Company
1400 East 30th Street • Cleveland 14, Ohio

SEND FOR YOUR FREE COPY OF BULLETIN F-10

LARGEST PRODUCER IN THE COUNTRY
ENGAGED EXCLUSIVELY IN THE MANUFACTURE OF FITTINGS

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Circle 46 on Reader Service Card

AIR-MITE

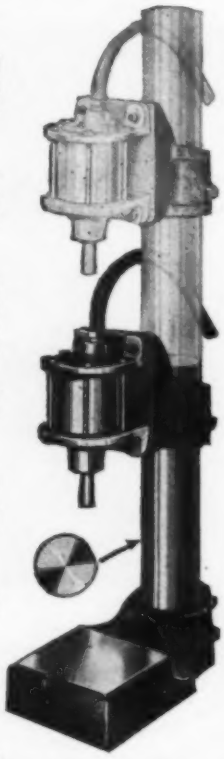
AIR ARBOR PRESSES

(AIR OR SPRING RETURN)

Completely Flexible

AIR-MITE now supplies solid steel upright columns in any lengths required to give you these important flexibility features:

1. Normal ram clearance of 0" to 6" may be increased to any clearance required for special application.
2. Supplementary or replacement cylinders with any ram stroke required are available for quick, easy mounting on same brackets.
3. Rapid socket wrench adjustment cylinder bracket swivels for perfect alignment with work.



Presses are available in ¼, ½, ¾ and 1 ton capacities — for staking, riveting, marking, punching and similar operations.

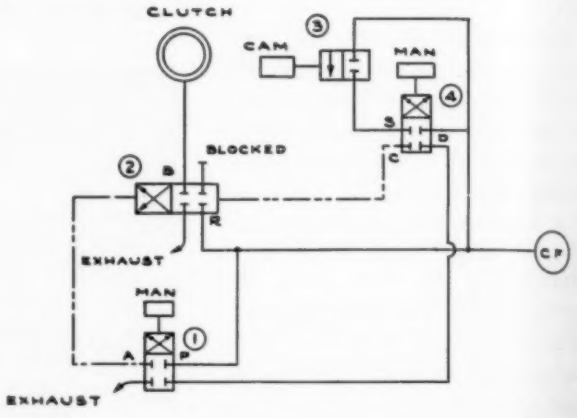
Write for complete catalog of Air-Arbor Presses and single and double acting Air Cylinders.

AIR-MITE

2651-K West Lake, Chicago 12, Ill.

(Concluded from page 44)

and D. The set-up man can now inch the press by moving valve 1. In the "on" position the main valve is moved to the right because air pressure on the left



end of the spool is greater than on the right. Releasing valve 1, reverses the main valve spool, for now air pressure on the main valve, from port C in valve 4, can move the spool.

S. B. S.

$10 For the Month's Best HERE'S HOW
Every Item Published Earns **$5**

REDUCE DOWNTIME *with* HILCO HYDRAULIC OIL FILTERS TO KEEP YOUR OIL CLEAN

RP-1

★ A HILCO WILL PREVENT OIL SLUDGING - PUMP AND VALVE FAILURES

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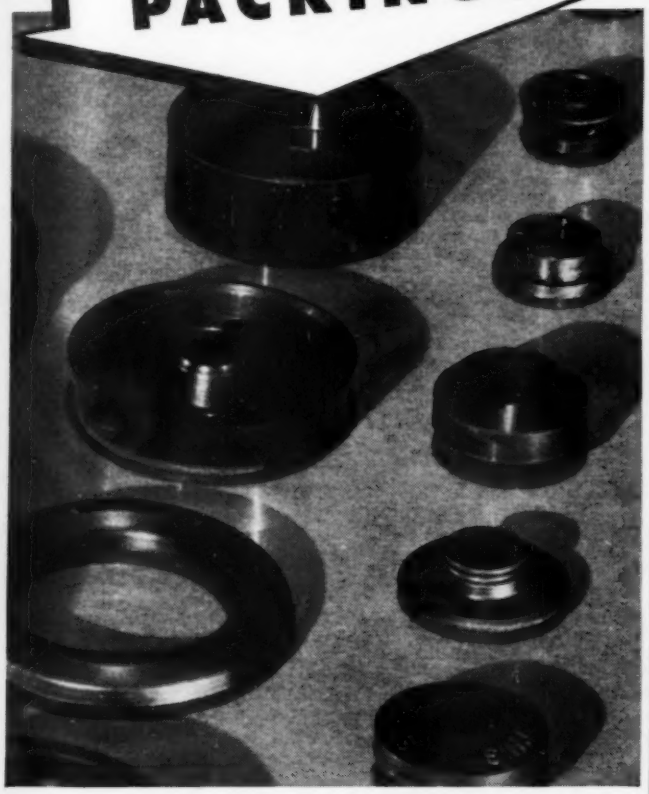
IN CANADA . . . UPTON-BRADEEN-JAMES, LTD. 990 BAY STREET, TORONTO . . . 3464 PARK AVENUE, MONTREAL

Standardize
ON THE BEST!

ACADIA
HYDRAULIC and PNEUMATIC
VEE and CUP
PACKINGS



There is a reason why more and more users of hydraulic packings have come to standardize on ACADIA Vee and Cup Packings. They have learned they are much superior in *over-all* performance. They can depend upon their uniformity. They feel confident that when Acadia Packings go into the product there will be an absolute minimum of complaints from this source. So join the ever-increasing list of builders of equipment who standardize on Acadia Packings. A complete line is available.

Acadia Packings are molded from highest grade synthetic rubber compounds that meet a wide range of applications. Sizes: Vee rings 3-16" i.d. to 24" i.d.: single acting cups available from 5-16" to 15⅜" o.d.: Write for new Acadia Packing booklet giving essential facts about physical properties, designs and applications. Acadia engineers will be happy to cooperate.

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Processors of Synthetic Rubber and Plastics • Sheets • Extrusions Molded Parts

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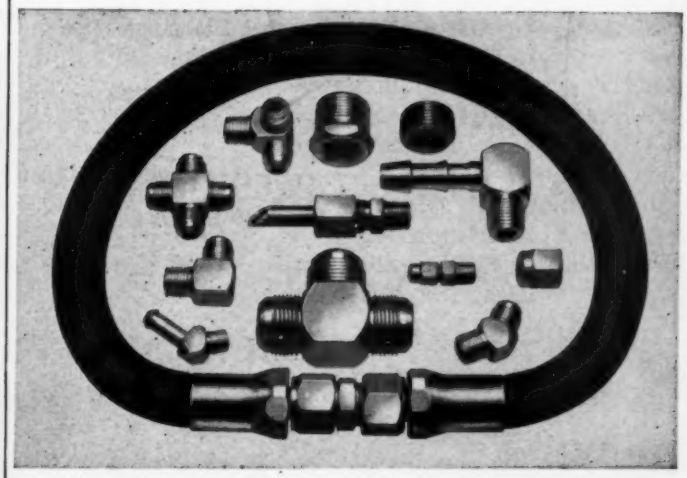
WHEN YOU CHANGE TO
J. I. C. Standards
LET L & L SERVE YOUR HYDRAULIC PIPING NEEDS



- **STEEL TUBE COUPLINGS**

  for ⅛th to 2 inch O.D. tubing
  2 PIECE TITE-SEAL FOR ECONOMY
  3 PIECE LOCK-JOINT-SLEEVE TYPE

- **HOSE ASSEMBLIES**

  with pressed-on coupling for single and double wire braid hose

- **PIPE FITTINGS**

  Straights, Ells and Tees with "Dry-seal" pipe threads (N.P.T.F.)

- **PRE-FABRICATING TUBES**

  Let us estimate your preformed tube assembly needs.

• Your installation problems are solicited. Write for catalog and technical data. We also have technical and sales representatives in your area for your convenience. All standard items are shipped from stock the same day your order is received. Excellent service on "Specials".
A few select territories are still available to progressive distributors of Hydraulic equipment—Inquiries invited.

Hydraulic Accessories

L & L Manufacturing Co.

8088 EAST NINE MILE RD. VAN DYKE, MICH.

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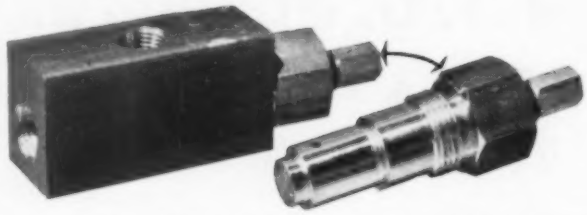
RELIEF VALVES



Model No. 1601-3, ⅜" pipe size, cartridge type

- SILENT
- CONSTANT PRESSURE
  Adjustable—500 to 4,000 P.S.I.
- ECONOMICAL

LIST PRICE $12.50
F.O.B. Willoughby

Resale & Quantity Discounts

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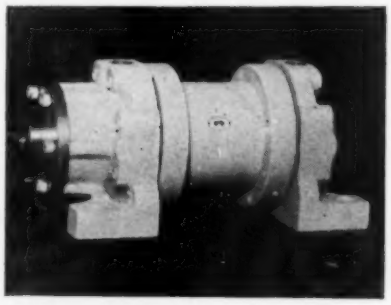
COMPARE —

"POWER-PLUS"
HYDRAULIC CYLINDERS
Air — Oil — Water

Seven Standard Mountings
Sturdy! Dependable!
They have Every Improvement

Premium Cylinders at No Premium in Price
Pressures to Meet Your Requirements —



In four Pressure Ranges:
200 p.s.i.
750 p.s.i.
1500 p.s.i.
3000 p.s.i.

Bores from 1" to 24" — Strokes to 18 feet.

Designed and Constructed to J.I.C. Standards
Write for complete information and engineering data

NEPTUNE-POWER PLUS PRODUCTS COMPANY
2228 Bellevue, Detroit 7, Michigan

Uniform Belt Tension Assured on Ryman Grinders by NOPAK Cylinders Controlled by NOPAK Valves

Ryman specifies NOPAK Cylinders because they maintain a nearly constant friction in piston travel . . . the result of rigid standards in machining and assembly . . . assuring even belt tension at a given setting of the regulating valve. NOPAK Valves are specified because their construction seals them against dust and grit abrasion, and because of the convenient, positive, cylinder control which they provide. Consider NOPAK in your problems involving the application or control of Air or Fluid Power.

Write for Bulletin 100

NOPAK Model E Cylinder.

Backstand of Ryman Belt Grinder manufactured by Ryman Engineering Co., Elwood City, Pa. NOPAK Model E Cylinder, controlled by NOPAK 4-Way Valve, maintains constant, uniform belt tension.

GALLAND-HENNING MANUFACTURING CO.
Representatives in Principal Cities
2743 South 31st Street • Milwaukee 46, Wisconsin

NOPAK
VALVES AND CYLINDERS
DESIGNED for AIR and HYDRAULIC SERVICE

POST SCRIPTS OF INDUSTRY

NEWS · VIEWS · TRENDS

Pantex Manufacturing Corporation has appointed Raymond C. Forsmas as their hydraulic division representative for the entire west coast and Texas, as well as Kansas. A graduate of the University of Arizona, Forsmas has been associated with Magna Copper and North American Aviation. Last year he formed his own company in Los Angeles, Forsmas Engineering which, in addition to Pantex also represents Aerotec and Safeway Heat Elements.

R. C. Forsmas

Aeroquip Corporation announced a $500,000 expansion program to take care of the increased demand for its products. A plant addition of 55,000, square feet will provide space for all manufacturing activities of the company.

Arthur H. Van Wormer has been appointed manager Vickers, Inc., St. Louis office. He succeeds W. F. Driver who was recently appointed district manager of the northwestern states area.

Compressed Air Products of Maplewood, New Jersey announce the opening of their New York City office to be located at 400 Third Avenue, Brooklyn. The New York branch will be headed by Walter R. Ellis assisted by Martin H. Lipton and Elmer Bakelaar as Sales Engineers, covering the greater New York area including Long Island.

Kepler Engineering Co., Cleveland, has been appointed representative for the Hydro-Line Manufacturing Co. in Ohio and Northern Kentucky.

The appointment of Donald E. Mason as general sales manager of Colonial Rubber Co. has just been announced by Howard Farkas, executive vice president of The U. S. Stoneware Co. and its affiliated companies.

H. C. Ramsey, president of Worthington Pump and Machinery Corporation, announced today that Mr. Charles A. Butcher has joined the organization as assistant to the president.

Clifford B. Ives & Co., 105 Forrest Ave., Narberth, Pa., has been appointed representative for Chiksan Company, in the Philadelphia territory. The Rhodes Controls Company, 11 East 21st St., Baltimore, Md., has been appointed to represent Chiksan in the Baltimore area.

LOW-COST
POWER
Be sure to see our exhibit — Booth No. 1204—National Metal Congress, Amphitheatre, Chicago, October 23-28, 1950
for . . .
PULLING, PUSHING, LIFTING, FORCING, CLAMPING, PRESSING

Lindberg Air & Hydraulic Cylinders are available in a complete range of mountings—with any length of stroke.

- ★ Hydraulic Cylinders for pressures to 1500 PSI
- ★ Ten standard bore sizes from 2" to 8" inclusive
- ★ Standard air cylinders for pressures to 150 PSI
- ★ Mill-type heavy duty air cylinders for pressure to 250 PSI
- ★ Twelve standard bore sizes from 2" to 12" inclusive
- ★ Cushioned or non-cushioned
- ★ Non-rotating—double acting
- ★ Special cylinders built to order

Write for Bulletin 700, "Hydraulic Cylinders," or Bulletin AC-2, "Air Cylinders"

LINDBERG AIR & HYDRAULIC CYLINDERS

Lindberg Engineering Company, 2441 West Hubbard Street, Chicago, 12, Ill.

Aeroquip Corporation has announced the following distributors: Moorman Equipment Company, Cedar Rapids, Iowa; Behrens Auto Supply Company, Red Wing, Minnesota; George F. Hill, Caracas, Venezuela.

Shields Rubber Company, Pittsburgh, Pa., has been appointed distributor for Parker "O" rings, it is announced by D. W. Holmes, general manager of The Parker Appliance Company, Cleveland. Both stock supplies and application engineering service will be offered by Shields, located at 137 Water Street.

MacNeel Pierce, president of Plastic and Rubber Products Company, Los Angeles, announces the incorporation of the original company of the same name. The corporation will operate under the same management and key personnel, and M. A. Brown will continue as manager of the Chicago office. Thomas B. Keenan is vice president and Pearl Nyman is secretary-treasurer of the corporation.

The appointment of Douglas A. Kubna as chief engineer of the J. N. Fauver Company, Inc., 49 West Hancock, Detroit, is announced by John N. Fauver, president. Kubna's experience includes that of a machine operator at the Excello Corporation before the war and during which he was commissioned a fighter pilot, serving in the Eighth Air Force. He holds a Mechanical Engineering degree from Michigan College of Mining and Technology and is a member of Tau Beta Pi.

D. A. Kubna

Control Engineering Company has moved to a new and larger plant at 25986 Mound road, Centerline, Mich.

William A. DeRidder, head of Adel Precision Products Company, announces the change in the corporate identity of this company to Adel Division, General Metals Corporation. DeRidder becomes chairman of the board of the new corporation, Fred T. Miller has been named vice president of sales and engineering and Richard A. Stumm as vice president of manufacturing.

F. T. Miller

The consolidation merges Adel with the Enterprise Engine and Foundry Company of San Francisco and General Metals Corporation, with California plants at Los Angeles and Oakland and a third at Houston, Texas. DeRidder stated that no changes would be made in the existing operations or policies of the divisions of the new corporation.

SUMP TYPE
(Cutaway)

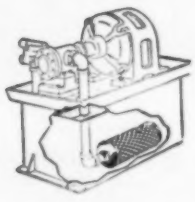
NOW OVER 160

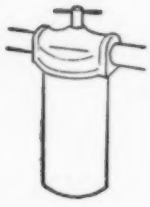
Manufacturers Make

MARVEL SYNCLINAL FILTERS

Their O.E.M. Choice

For HYDRAULIC EQUIPMENT where oil MUST BE CLEAN





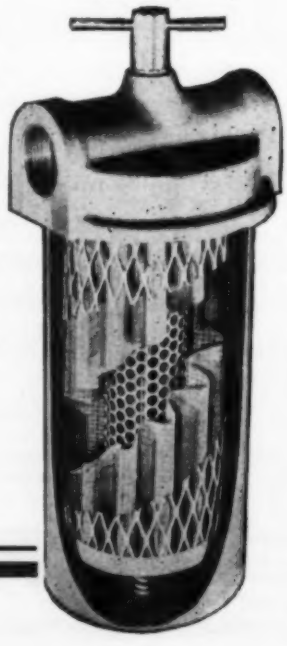
EFFICIENCY—Marvel Synclinal Filters give more filtering area than like size circular units. Preferred by maintenance men because larger filtering area extends periods of operation between cleanings.

SIMPLICITY—Marvel Synclinal Filters may be disassembled, cleaned and reassembled in minutes. A single handnut releases the line model housing without disturbing pipe fittings.

ADAPTABILITY—Marvel Synclinal Filters operate at full efficiency in any position and can be installed at any angle convenient to your machine. Wire mesh sizes from 30 to 200 available. Individual capacities of from 5 to 50 g.p.m. and greater capacities are obtainable by multiple installations.

For efficient filtration of liquids in all HYDRAULIC or LOW PRESSURE circulating systems Marvel has your answer. Write for catalogs 104 and 202.

LINE TYPE
(Cutaway)



MARVEL ENGINEERING COMPANY

625 W. Jackson Blvd. Dept. 91 Chicago 6, Illinois

Circle 53 on Reader Service Card

Initial J.I.C. Conference on Pneumatic Equipment

AN INITIAL JOINT INDUSTRY Conference on Pneumatic Equipment was held on May 3 in the General Motors Building, Detroit, R. L. Wilhite, Production Engineering Section, General Motors Corporation, presided and explained that the primary purpose of the meeting was to consider the formulation of J.I.C. Standards on Pneumatic Equipment which would serve a purpose in industry similar to that accomplished by the recent Hydraulic Standards and previously by J.I.C. Electrical Standards for Industrial Equipment.

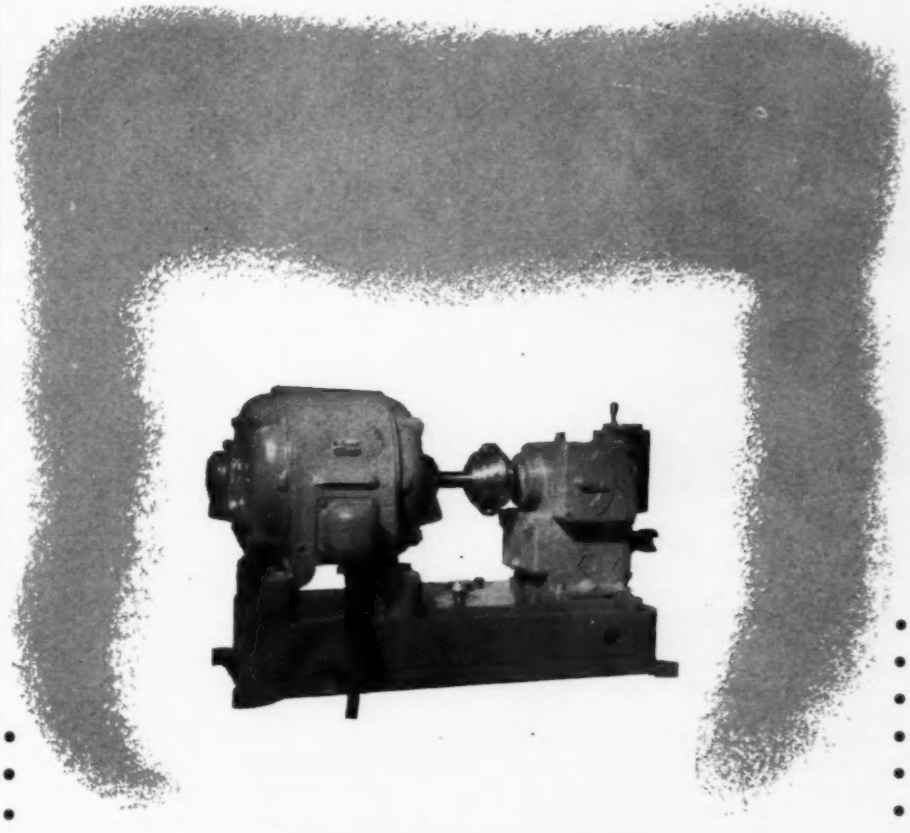
Over thirty representatives of the Packard Motor Car Co., Chrysler Corporation, Ford Motor Co., International Harvester Co., Kelsey-Hayes Wheel Co., Service representatives of the Air Material Command and of the Bureaus of Ordnance and Ships of the Navy and the major production plants of General Motors Corporation attended.

Mr. Wilhite explained the procedure of operation of J.I.C. meetings to those new to this type of meeting and pointed out the need for Pneumatic Standards by reviewing ways and means employed by various General Motors Divisions in reducing compressed air losses. These losses were attributed, to a large degree, to faulty pneumatic equipment and poor installation.

It was agreed among those present that J.I.C. Standards for Pneumatic Equipment should be set up and that the work of formulating detailed specifications for the application of pneumatic apparatus to machine tools and other industrial equipment which would promote safety to personnel, uninterrupted production, long equipment life, none of which would limit or control development in the art of pneumatic equipment, should be expedited.

A tentative J.I.C. Pneumatic Standards for Industrial Equipment was formulated, using the Hydraulic Standards as a pattern. Those specifications, including a Glossary of Terms, which applied to pneumatic equipment were adopted as a starter. This Tentative Pneumatic Standards was prepared as an agenda for a two day Joint Industry Conference which will be held on September 21 and 22 at the Ford Motor Company, Dearborn, Michigan.

In addition to the J.I.C. member companys' representatives who attended the initial planning meeting, invitatons are being sent to manufacturers of pneumatic equipment and to members of the National Machine Tool Builders' Association and the Resistance Welder Manufacturers Association with copies of the tentative Pneumatic Standards for study prior to the September meeting.



introducing the

NEW WEGNER HYDRAULIC TRANSMISSION

For complete descriptive data—write

WEGNER MACHINERY CORP.

35-41 11 ST., LONG ISLAND CITY 6, N. Y.

Circle 54 on Reader Service Card

1 PUT NEW SELLING POWER IN YOUR PRODUCT!

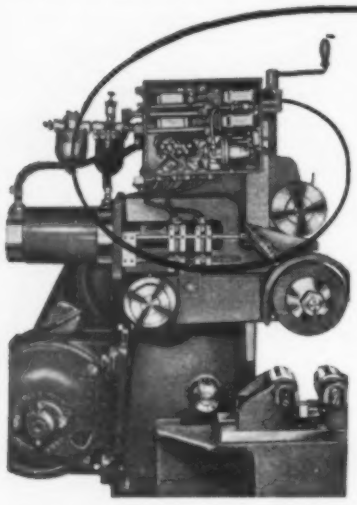
2 INCREASE YOUR PRODUCTION EFFICIENCY!

with REVOLUTIONARY

HY-CYCLIC AIR VALVES

FOR EXAMPLE:

STEEN HIGH SPEED PIPE AND TUBE CUT-OFF MACHINES NOW FEATURE HI-CYCLIC VALVE-OPERATED CUTTER ATTACHMENTS



CONTINENTAL Machine Company, Chicago, has greatly increased productivity of Steen Pipe & Tube Cut-Off Machines—increased cutter life—eliminated worker fatigue—by using Beckett Hi-Cyclic Air Valves to operate the cutter attachment. Here's how:

When operator steps on foot switch, air cylinder, controlled by precision Hi-Cyclic Valves, makes a fast approach of the blade to the pipe. There's a split second slow down to allow the blade to make gentle contact with the pipe and start revolving it—then, steady, powerful pressure is applied, cutting the pipe at high speed. The blade is then automatically retracted for the next cut. Every action is fully and completely controlled—without hydraulic checks—by the Beckett Hi-Cyclic Air Valves!

Hi-Cyclic Air Valves provide—for the first time—absolute control of air power! Investigate this remarkable new development in air engineering. Write for bulletin describing Beckett Hi-Cyclic Basic, Single and Double Solenoid, Piloted and Hydraulic Valves.

BECKETT-HARCUM CO.

1145 Wayne Rd.
Wilmington, Ohio

Circle 55 on Reader Service Card

Main-Ten-Ends

REDUCE PRODUCTION COSTS

End 2. Standardize on the type of hydraulic equipment in your plant.

Standardization will result in interchangeability of equipment, making your machines easier to service. Training of maintenance men and the purchase of repair parts will be made easier. Inventory of spares and parts will be reduced. When outside service is required, standardizing will centralize the responsibility for the equipment on your machines.

When standardizing:

1. Make your selection on the basis of quality and performance of equipment.
2. Select a line of equipment which is wide enough to meet your needs.
3. Choose a source which can best take care of emergency service replacements and engineering.
4. Select a line which is progressive in its development.

The following is an excerpt from comments on End 2 made by J. K. Douglas, Development Engineer, The Oilgear Company, at the ASLE meeting where Main-Ten Ends were originally presented.

"We believe in standardization but standardization should be based on obtaining the best performance available from a minimum number of varieties of units. Some varieties may be furnished by one manufacturer and some varieties by another, but if you try to base your selection of hydraulic equipment in accordance with the name of a manufacturer rather than the quality and performance of the equipment in each specific field, you sacrifice the cream of modern development progress."

End 3. Before you buy a hydraulic machine, make certain it will meet your production and maintenance requirements.

When you buy a machine you buy production—and maintenance. Therefore your choice should consider initial cost plus maintenance cost.

The hydraulic circuit must meet your operating requirements. Review the circuit from a maintenance standpoint.

THE MARKET PLACE

CLASSIFIED ADVERTISING

Rates: For "Positions Wanted" $4.00 minimum, limit 25 words. For all other classifications $4.50 minimum for 25 words, each additional word 15c; bold face type or all capitals, $7.50 minimum for 25 words, each additional word 20c; limit 50 words. Box addresses count as five words. All insertions are payable in advance.

These columns are limited to Help Wanted or Position Wanted ads, and offerings of used equipment by the users of such equipment.

Designer — Design Engineer
Experienced in construction and material handling equipment. Wanted by progressive manufacturer located in mid-west section. Excellent opportunity for right man. Give experience, educational background, salary exp., availability, etc. Box 8150 APPLIED HYDRAULICS.

HANSEN COUPLINGS

GIVE YOU 2 Big Advantages

1. QUICK CONNECTION AND DISCONNECTION

2. INSTANT AUTOMATIC FLOW OR SHUT-OFF

With Hansen couplings you save precious minutes every time you connect or disconnect a fluid line carrying gas, liquid or grease.

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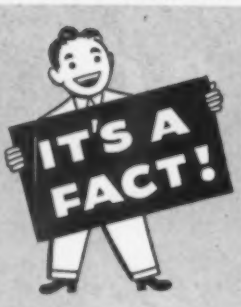

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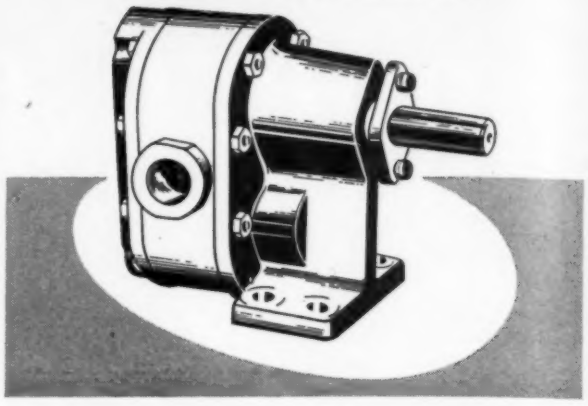

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YARWAY

Improved Type

HYDRAULIC VALVE

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Simplify Maintenance

(Concluded from page 37)

"take-up-time" on pump bearings. This take-up is recommended by some pump manufacturers. On a test bench it is possible to adjust the opening or closing pressure of valve. On a press, for instance, a large piece of hot steel might be required to offer enough resistance to the travel of a ram in order to adjust the pressure setting of the same valve. Often it is the resistance of the press ram which actuates the valves that set in motion the press auxiliaries, such as ejectors and piercing tools.

Valves and controls are easily checked and adjusted on a test stand if a variable source of pressure is available. There are several kinds of pressure boosters on the market, and in addition to their use in machine circuits they can be used on the test bench, and as a power unit for hydraulic jacks. Down-time can be reduced if spare valves, controls and pumps are maintained and adjusted before placing them in service on some presses; the product might be ruined by adjusting hydraulic controls which could be adjusted beforehand on a test bench.

5 **Consult the machine operator when trouble shooting.**

In trouble shooting careful consideration should be given to the machine operator's comments. He has first hand knowledge of the action of his machine. Often he will be able to quickly lead you to the trouble spot. Unfortunately many operators think all of their hydraulic troubles are due to a lack of pressure, and it is sometimes rather difficult to correct this way of thinking.

6 **Practice "Hydraulectomy", keep the circuit to its bare essentials.**

While you may be unfamiliar with the word, "Hydraulectomy" it has become a popular operation in our plant. Briefly, it consists of the removal of all the extra "gingerbread", "jimracks", "gizmos", etc. from the machine circuit. Often by reducing a hydraulic circuit to its bare essentials a lot of grief can be eliminated, and, at no cost to the rate of production. While we all appreciate the automatic features of hydraulic machinery, it is sometimes better to have a mechanic make the "set up" and eliminate trouble which comes from having too much complication in a circuit. By complication is meant controls which are used only in changing over from one method of operaton to another. At times these controls "freeze up" or stick because they are not used often enough to keep them freed and in good operating condition.

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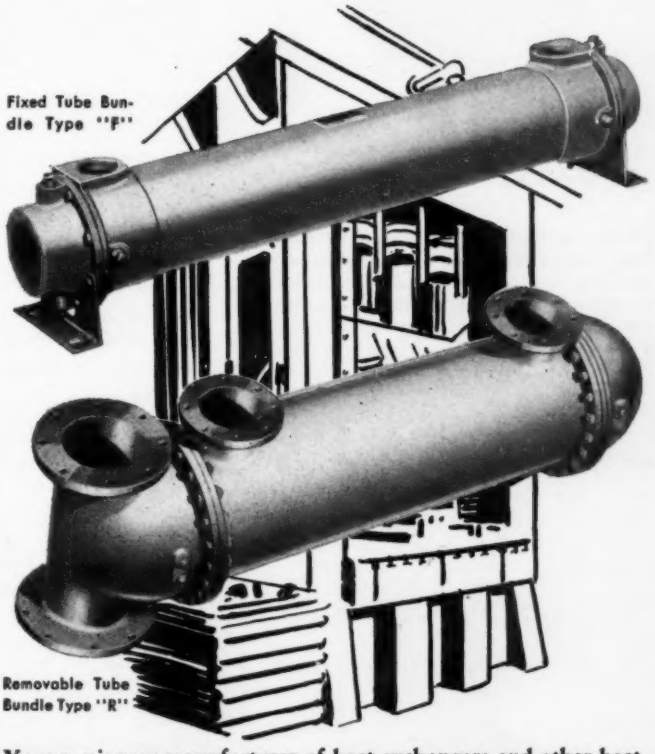

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A self contained unit supplied complete with Model 216-C Pump, oil reservoir and necessary controls. Capable of providing output fluid pressures to 30,000 PSI from 100 PSI plant air supply. For oil service. Other models available for other corrosive liquids.

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DIRECTIONAL VALVES

(Concluded from page 47)

Such movements are normally timed by the ability of the oil to reach a predetermined pressure at the proper time. Such valves are also used to hold a piston or head at a fixed point for an indefinite period.

Both adjustable and nonadjustable sequence valves are used. Figure 108 shows a nonadjustable sequence valve. The plunger is hollow and has an inner passage with a check valve at its base and an opening at the top, so that oil can flow upward through the valve but is prevented from returning until pressure above the piston increases sufficiently to unseat the valve by compressing the spring at its base. Then the whole plunger descends, permitting downward flow until pressure above the valve is lowered to the resistance of the spring, when the plunger is again seated.

Figures 109 and 110 illustrate the operation of an adjustable sequence valve. In Figure 109 the oil flow from the pump enters the valve, compresses the very light spring under plunger P2, opening passage to the cylinder. The plunger P1 is held closed by an adujstable spring. Oil flows from the pump through the adjustable valve past plunger P2 to work cylinder at minimum resistance.

In Figure 110 the reverse flow is shown. A desirable or predetermined back pressure is provided by a setting of the adjustment screw on the spring behind plunger P1. When the desired back pressure is reached, plunger P1 moves up, compressing its spring and oil is free to flow through the valve at the desired back pressure to the reservoir.

Chapter VII will be continued in the next installment with a discussion of valve blocks and panels. Be sure to retain this installment for future reference.

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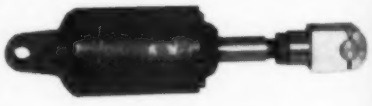

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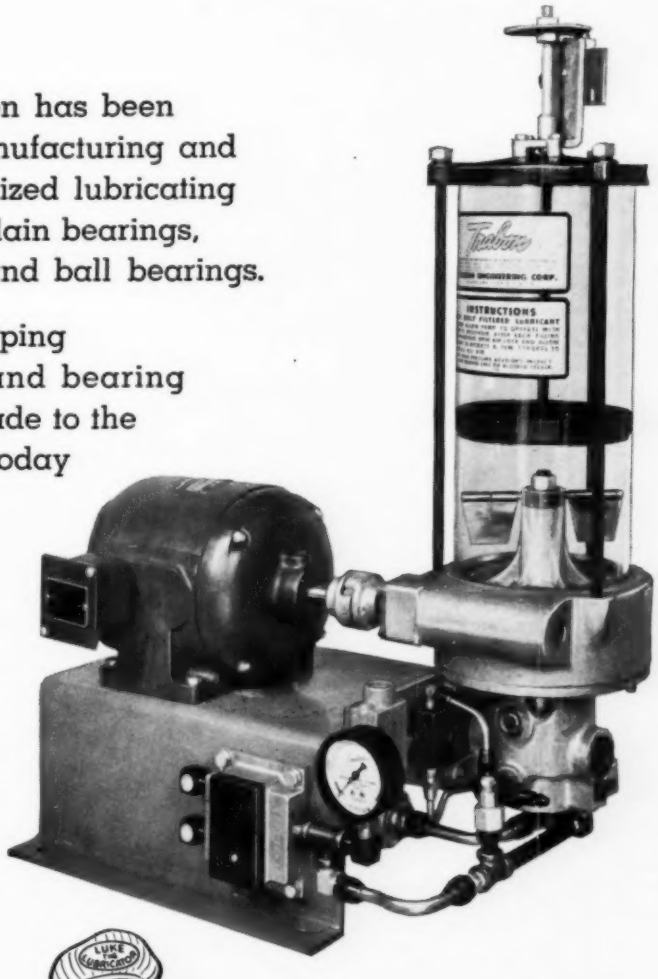

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Dear Reader:

From the very first issue of APPLIED HYDRAULICS Magazine, each month we have received hundreds of requests from our readers for information on where certain hydraulic and air circuit equipment can be purchased and what companies make this type of equipment. There is now no one place where such information can be obtained.

To provide a central reference, APPLIED HYDRAULICS Magazine, as a service to its readers, will issue each year an Equipment Directory Issue. The first annual Directory Issue will be our January 1951 number – it will include:

(1) A complete product listing
(2) A manufacturers listing
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